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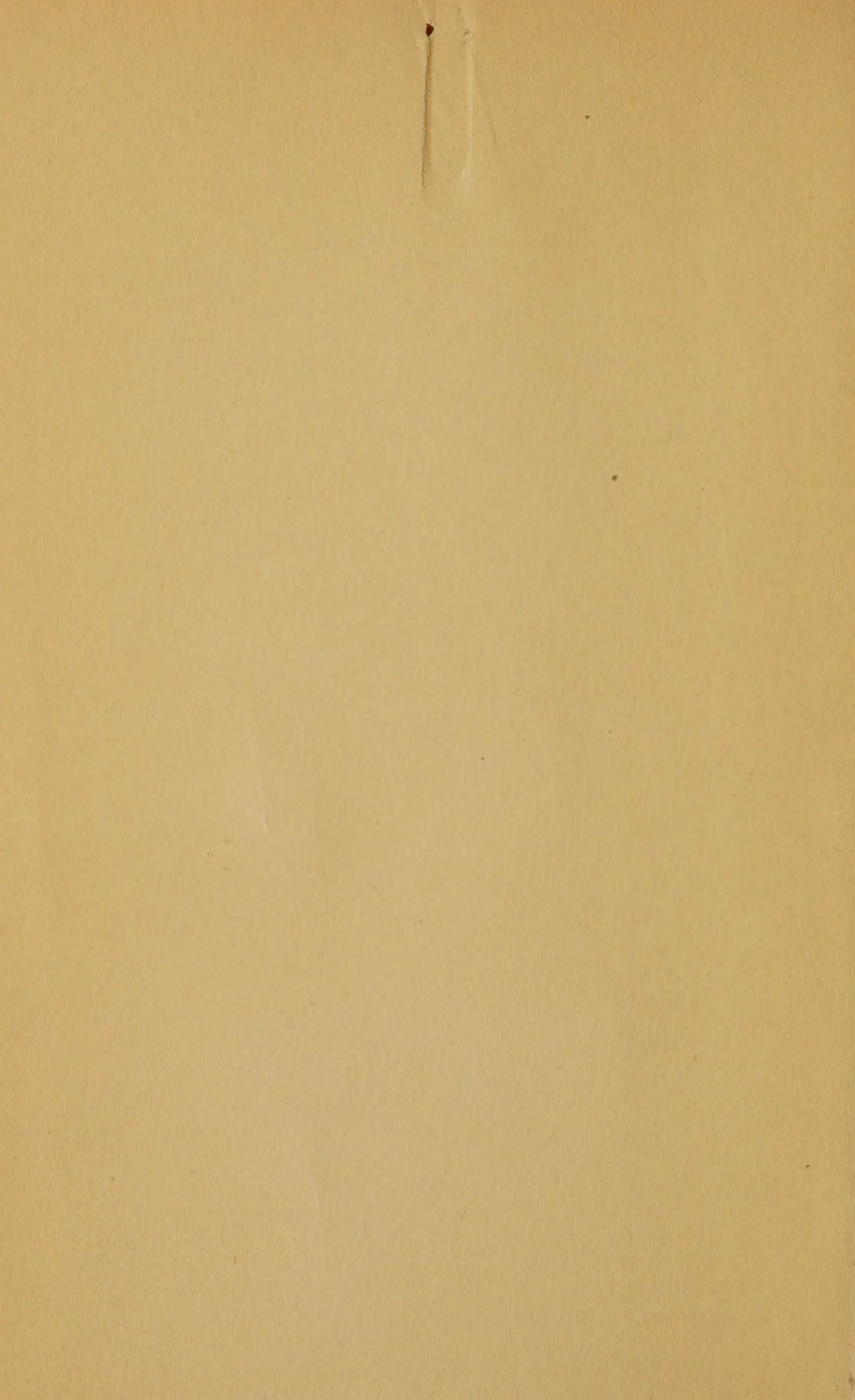
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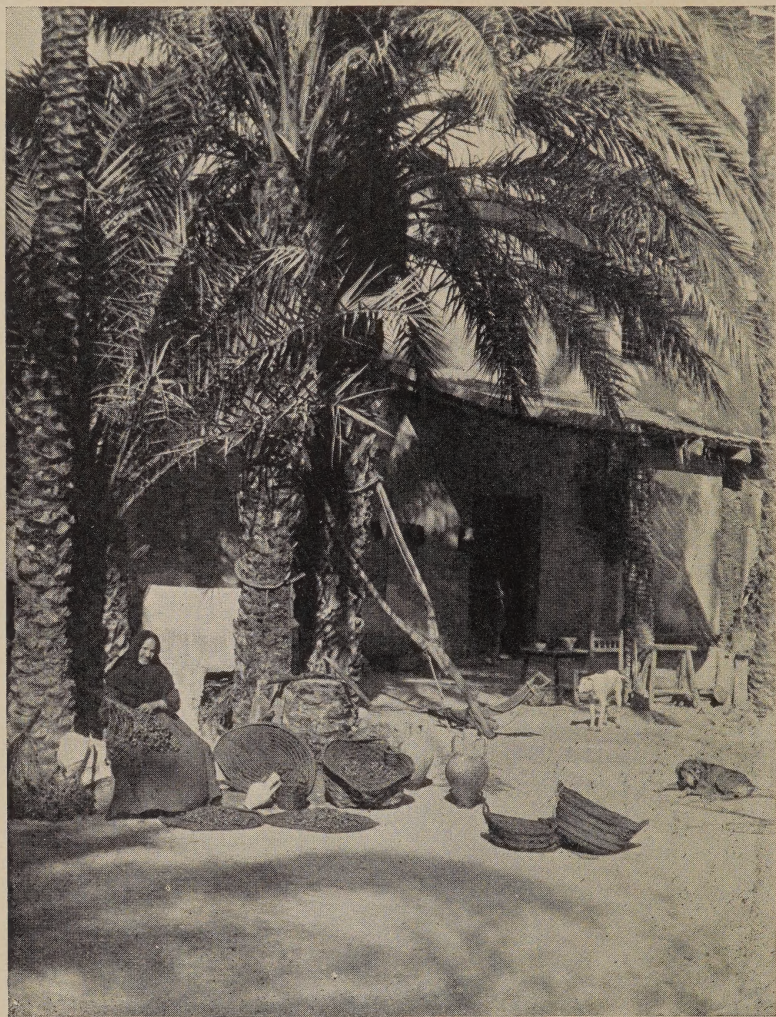
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FOOD PRODUCTS FROM AFAR



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SORTING DATES AT ELCHE

FOOD PRODUCTS FROM AFAR

A POPULAR ACCOUNT OF FRUITS AND
OTHER FOODSTUFFS FROM FOREIGN LANDS

BY

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CHIEF CHEMIST, THE SOUTHERN COTTON
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WITH MANY ILLUSTRATIONS



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PREFACE

THE aborigine set up his tent where the mountain brook splashed into the lake or near the trail of the forest deer, the easier to obtain his daily food. The early settlements were located at fords or at the junction of beaten paths where folk stopped to buy and sell produce. Cities sprang up at the country cross-roads, because there the farmer met the merchant that they might barter with one another. To-day our nation stands at the intersection of the world's trade-routes and we may take toll of all the earth's food-stores.

We have broken the last stretch of virgin prairie. Henceforth sufficient food for a rapidly growing population must be obtained by decreased exportation, more intensified farming, or the increased importation of food products from afar. Thus it becomes of special interest to us to know not only what are our possible sources of domestic supply, but where we can obtain additional food for ourselves and our children.

It is the object of this story of the raising and marketing of foods from foreign lands to discuss imported foods—those that come from outside the continental United States. How are these commodities grown in the lands from which we bring them; how are they prepared for the market and trans-

ported to our own shores? Perhaps many of the foods that we now import could be grown at home, should their supply be cut off by wars or tariffs. Even under present world conditions, might we not profitably curtail the list of "foreign foods" and, in cases where we now raise a partial supply of a product, raise enough for our entire population in this land that has such a diversity of soils and climates?

There are many delicious foods practically unknown to all save the globe-trotting portion of our population. Some of these, if we understood their cultivation, we might raise to advantage. A knowledge of "what other people eat," just as of what they think and say, is of practical interest. Also, we may profitably learn something of the composition and dietetic value of these foreign foods, so as to select them judiciously and use them economically.

The material here collected is gathered from a variety of sources which are not readily accessible to the reading public. Those who wish to know something about our foreign food supply, will find these pages a satisfactory source of information. Pains have been taken to insure the use of facts and illustrations which are scientifically correct, and at the same time a minimum of dry statistics and technical terms have been employed. It is our hope that he who is primarily interested in the eating, as well as he who specializes in the marketing or preparation of foods, will find much of entertainment and profit in this volume.

THE AUTHORS

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FOOD PRODUCTS FROM AFAR

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CHAPTER I

WHO FEEDS US?

HOW the world is fed became for us a few years ago a vital question. When we had abundant crops and the ships of every nation were bringing the comforts, the luxuries, and the necessities of life into our Atlantic, Pacific, and Gulf ports, we ate, drank, and made merry. Then when something happened, when the warehouses of the importers became empty of food products, when, even if there were food-stuffs on the dock in the foreign port, there were no bottoms available to ship them to us, then the question which arose and clamored for answer was: Where does our food come from, anyway?

Abundance or scarcity of food is often the crucial factor that determines success or registers failure to a nation in a great struggle. Is the country self-supporting as to her food supply? Has she resources within herself so that if all outside provisions are cut off by a blockade her people will remain well nourished? We have had scores of illustrations as to what can be done to avert scarcity of food when the wise heads of the government see it impending. The people are taught "thrift," a

word that had for all nations during the war a new meaning; they have had to farm intensively, a much needed lesson; they have had to eliminate waste, and finally perhaps to "eat everything" that contained even a little of the starch, sugar, fat, and protein so essential to life. This self-denial does not always suffice; and China, southern Europe, and more recently Russia have suffered terribly from famine.

Without discussing the immense resources of the United States or showing what has so often been demonstrated, that we are as a nation altogether too much puffed up with pride over what we possess, it may be worth while to talk, not so much about what we have, as about what we have not.

The children in the geography class learn that in many countries a large proportion of the food comes from outside sources. Before the World War, England produced only one-fifth of the food which she ate, Italy two-thirds, Germany four-fifths. England, Scotland, Norway, Italy, Holland, and the Rhine countries had become dependent for a large part of their food upon what was brought into their ports. When overseas transportation closed they quickly felt the pangs of starvation.

With us in the United States the conditions are different because of the richness of the virgin soil, our variety of climate, and the extent of arable lands. Even we, however, have local non-supporting areas; New England or New Jersey, for instance, would soon starve but for the food-stuffs that are constantly brought to their doors. This is the result, natural and inevitable, of the increasing population.

A nation's standard of living is almost an exact mathematical function. By a "living" we mean the hours of labor necessary for the average individual to acquire a reasonable amount of food, clothing, and the other necessities and comforts of life. Then the standard of living of one nation as compared with that of all other nations is simply the productive area of a country divided by its population. In other words the number of inhabitants per square mile of land yielding crops, minerals, or other resources. To-day America has reached the limit of her possible expansion into virgin territory; she may and will develop her resources, but she cannot acquire additional ones. Our population is increasing even without immigration, and as it does our standard of living must fall, except in so far as we can compensate for added members by added efficiency in production of food and other commodities.

What has been done in Great Britain in the last few years to bring into active practical use thousands of acres that were unproductive so far as raising food-stuffs was concerned, is a splendid illustration of the results of persistent effort, urged on by necessity. Not only can the quantity of food in a given country be greatly increased by planting increased acreage, as America has done with wheat, but the variety may be much enlarged by the cultivation of foods that have been grown only in limited areas and by the introduction of new and heretofore unknown food products.

In this country there are some foods that we have always obtained from outside. This is partly due

to the fact that here, notwithstanding our wonderfully varied climate, north and south and east and west, there are still some fruits and vegetables that are not suited to economical growth. To a considerable extent this is because we have not taken the trouble to investigate and to see whether we cannot really grow these products just as well as import them. It does not necessarily follow, however, even then that it is inadvisable to import rather than to produce them ourselves.

Up to the present time we have taken little thought concerning what foods we might raise and what we can better import. It was of little consequence to us as long as we got what we wanted. If eggs could be imported from China for less than it would cost to feed the hens and hunt the eggs in the haymow, we imported the eggs, and recently a big trade has grown up in dried Chinese eggs. We imported 17,896,857 pounds of dried and frozen eggs in 1921. If potatoes could be grown in Ireland or the Netherlands and shipped two thousand miles across the sea to be sold in Fulton Market for less than the farmers in Maine or Michigan or Wisconsin thought they could raise them and pay the railroads to haul them, let the ocean carriers be burdened with potatoes even if some other merchandise must await transportation on the European docks. As a matter of fact an entire shipload of potatoes was brought over in 1920 and sold in one of our South Atlantic ports.

The waste in domestic transportation is also painfully illustrated in many of our markets. Fruits and

vegetables that might be raised in Missouri, a Central State, are shipped hundreds of miles, perhaps in refrigerator-cars, from the Pacific coast, because the farmers of Missouri have not devoted painstaking care to soils, fertilizers, cultivation, spraying, and methods of marketing, as have the Californians. We concede that the shipped fruit has no better flavor or appearance than the home-grown, yet because the fruit-growers of some other section have the enterprise to push their products, we smilingly accept them and pay the added transportation charges.

There are several reasons why we have imported foods that we could just as well raise at home. Look over the table of imports and exports, and you are surprised to learn that food-stuffs have been shuttled back and forth over the world regardless of whether they could be raised in our own country or not.

For the year ending December 31, 1921.

	<i>Imported</i>	<i>Exported</i>
Beans, edible (bushels)...	274,058	1,409,703
Onions (bushels)	1,976,083	867,342
Peas, dried (bushels).....	512,994	124,720
Potatoes (bushels)	2,017,562	3,499,838
Beef, pickled (pounds)...	1,446,634	24,570,582
Beef, fresh (pounds).....	32,377,922	10,412,790
Molasses (gallons)	78,110,190	5,552,070
Cheese (pounds)	26,866,404	11,771,971
Eggs, fresh (dozen).....	3,062,601	33,497,287
Milk, condensed, etc. (pounds)	8,667,626	299,171,768

For the year ending December 31, 1921. (Continued)

	<i>Imported</i>	<i>Exported</i>
Distilled liquors (proof gallons)	486,774	264,491
Peanuts (pounds)	40,000,000	14,492,651
Raisins (pounds)	16,879,933	32,968,664

As an illustration of the fluctuating character of the market we observe that food-stuffs to the value of \$210,000,000 were imported in August, 1920; the corresponding figure was only \$84,000,000 in August, 1919, and dropped again in 1921 to \$46,000,000.

The chief reason for this backward and forward moving of food is that it pays the importer or exporter to do it. That has naturally been in almost all cases the answer to the question: Shall the food-stuffs be forwarded? It is of course true our country is so large and the difference between water and rail freights so great that the cost of laying down some things on the Atlantic seaboard, lemons for instance from Italy, is less than the cost of shipping them from California. You say it is fortunate that the food products of the world can be so readily moved from one section to another to relieve shortage and "stabilize" prices. This is true within certain limits, but lack of forethought to maintain our own domestic supply always adds to the cost for the consumers. There are actually many farmers in the United States who do not "take the trouble" to raise garden vegetables for home use, so engrossed are they in raising a big crop of corn or wheat or hogs. If they have any of these "luxuries" they ship them out from the cities, and since they

are not fresh they are of course inferior in quality.

Besides the importation of foods for economic reasons, many of us still think the foreign product better, and since we are willing to pay more for it the importers are ready to handle it. In many cases it is true that the foreign food product cannot be imitated, or at least has not been imitated, in this country. We may have a Camembert "style" of cheese or an Italian "style" of macaroni, but for many these do not equal in flavor the genuine imported varieties.

There has been no persistent effort to raise certain fruits and vegetables here, because we have found it easier to import them. A very creditable attempt has been made by the United States Department of Agriculture to introduce new fruits and to stimulate experiments in the growing of foreign food-stuffs, but such a propaganda takes a long time and must necessarily proceed slowly. The agents of the department have visited all lands known and unknown and have discovered an endless variety of fruits, nuts, and other edible products about which we before knew nothing. The ultimate result should be that any food adapted to the climate of the continental United States would be produced in abundance here.

Not only ought we to be self-supporting as to abundance of our food, but it is economy to raise the greatest variety as an insurance against the failure of some particular crop. Our farmers of the Central West have long since stopped depending entirely on a single crop, as corn or wheat or pota-

toes, for they realize that if one crop fails, another will see them safely through the year. In the South the low price of cotton in 1920 helped more than years of preaching to impress the growers with the importance of raising corn, peanuts, and live stock.

Variety in foods is an indication of a higher civilization. The primitive tribes of necessity lived on a few staples, with little variety. It was often difficult enough to get what was needed to sustain life, and there was no thought bestowed on diversity of food. We know that a variety in food stimulates the appetite and favors good digestion. The common people of Europe have been depending very largely upon bread and beer or wine, with vegetables and very little meat. They had not even become accustomed to corn (maize) as a staple food. So when the war came on we could not help them as much as we otherwise would with a cheap food, because they did not know how to cook and prepare corn products and, what is more important, had not acquired a taste for them. We had to ship our wheat to them and eat corn-bread ourselves.

With our great available multiplicity of foods we do not miss so much the deprivation of one member of a class of products. We more readily shift into another variety for our nutrients. When wheat is scarce we get along with any one of half a dozen other cereals; and in the future, since we have learned to do this, we shall be less dependent on wheat products than ever before. We have learned a lesson of variety which will stay with us after the necessity of saving wheat has passed.

In the seaports all over the world there is a busy interchange of commodities, and not the least of these are the food products. This ceaseless movement is well described by Ernest Poole in "The Harbor":

I went into the dock shed, and there I stayed right through the night until my mind was limp and battered from the rush of new impressions. For in this long sea-station under the blue arc-lights in boxes, barrels, crates, and bags, tumbling, banging, crushing, came the products of this modern land. You could feel the pulse of a continent here. From the factories and mines and mills, the prairies and forests and plantations and vineyards, there flowed a mighty tide of things, endlessly, both day and night; you could shut your eyes and see the long brown lines of cars crawl eastward from all over the land; you could see the stuff converging here to be gathered into coarse rope nets and swept up to the liners. The pulse beat fast and furious. In gangs at every hatchway you saw men heaving, sweating; you heard them swearing, panting. That day they worked straight through the night. For the pulse kept beating, beating, and the ship must sail on time.

We can never be wholly independent of our neighbors, for some foods must be imported, but cannot we change the present condition of dependence? It is true that if isolated we should, to be comfortable, have to double our sugar production, or limit its use, as other nations have often done. Sugar is not a luxury, however; it is a food, and the quantity should not be limited. We shall, for a long time, probably always, be dependent for our tea, coffee, and cocoa and for spices on a foreign supply, but much of the other food material that we import is not so much a necessity to daily life as a wholesome addition to

the variety that supplies the table. We should certainly miss these foods if they were unobtainable.

For the purpose of classification, our foods may be divided as follows: (1) those foods produced in abundance in the United States which are seldom imported from other lands; (2) those products which are grown here, sometimes in sufficient quantities so that we export them, but which are often so scarce that we import them; (3) food products raised in this country but not at present in quantities nearly sufficient to supply our needs; (4) products which are grown here only in limited quantities or not grown at all, and which must be virtually all imported; (5) those products for which a taste has never been cultivated, or which are perishable and transported with difficulty and hence have never been imported.

This classification does not include imports from what our Bureau of Foreign and Domestic Commerce calls "non-contiguous territories." If the islands, such as the Philippines, Hawaii, and Porto Rico, which are under the control of the United States, be included, the amount of the so-called imports would be sensibly diminished, and the variety of "imported" foods would be much smaller.

The foods in the first and second classes may then, for our purpose, be disregarded, as they are usually grown in quantities sufficient for home consumption in the continental United States.

Among the foods of the third class raised in this country but not at present in quantities sufficient to supply our needs, these may be mentioned: Rice,

paste products, sugar, honey, figs, grapes, loquats, peanuts, walnuts, lemon oil, tomato paste, olive oil, onions, dried peas, cheese, lemons, prunes, raisins, eggs, cassava, fish, shrimps, almonds and mushrooms.

Those products included in our fourth class, which are virtually all imported, are: Dates, cocoanuts, Zantee currants, litchi nuts, Brazil-nuts, filberts, bananas, pineapples, pomegranates, tamarinds, rape-seed oil, soya bean oil, cocoanut-oil and other nut oils, olive oil, palm oil, oil of lemon, spices, tea, coffee, cocoa, and chocolate.

In the fifth class are included a large number of foreign fruits, nuts, and vegetables, and some meat and fish products that are in common use in Mexico, Central and South America, China, Japan, and the Orient in general. These have never found favor here, either from lack of knowledge of their desirable qualities, from the fact that a taste has not been cultivated for them, or because many of them, especially fruits and vegetables, are of such a perishable character that they will not bear transportation and can only be used where they are grown.

The food products included in the list as "foreign" may be a surprise to some who have not considered the amount used with relation to the actual quantity raised in the United States. We do not always raise enough rice for home consumption, but if we were sure that the crop would "pay," the acreage might be largely increased. The recent scarcity and high price of sugar has shown us how dependent we are on extra-continental countries for this com-

modity; the annual importation of cocoanut products alone indicates that with our immense yields of pork and beef, cotton-seed oil, and corn oil, we still lack fats in sufficient quantity to feed the people. The sea is full of fish, yet we draw a large supply every year from Canadian and European waters.

The entire commerce of the world has been so disorganized by the war that in some lines it will take a long time to get back to a normal condition, and in other cases we shall never regain our former trade. The people of Continental Europe have learned to do without some of our products that they once thought essential; and we, on the other hand, have learned that we can substitute something of our own production for what we formerly imported. The pool of the world's commerce has been made so roily that no one can predict when the waters will again be settled. This is then a good time to look over our store of food products and find out to what extent we can in the future be self-supporting.



ORIENTAL OILS UNLOADED AT SEATTLE



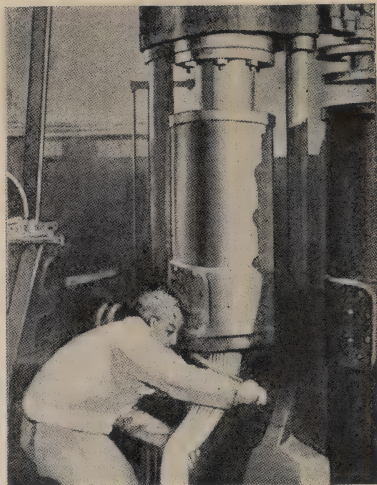
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FISHING PORT IN NORWAY



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EATING MACARONI AT A STREET
BOOTH



TRAFILA, USED IN MAKING
MACARONI



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DRYING MACARONI

CHAPTER II

MOLDING THE ITALIAN PASTES

Italian sunshine and blue skies, concentrated in flour paste, wrought into tubes and ribbons and squares and lozenges, come to gladden the sinking heart and cheer the drooping spirits.

IT was from Italy that the Yankee nation first learned the delectable taste and later the nutritious value of macaroni and other pastes. The small army of Italian immigrants who came flocking to our shores every year did not feel at home without their staple food, and they very soon imported it from across the water or tried to manufacture it here. The taste for this food extended to their neighbors, for if it was good for Italians it was good for Americans, and naturally the supply came to meet the increased demand.

It is related by Mathilde Serano, the Italian journalist, that in 1220, the time of King Frederick, in a little alley of the Cortellari on the top floor of a tumble-down house, there lived a man known as Cicho. He had the reputation among his neighbors of being a sorcerer, because the woman Javanella, whose window opened on his balcony, had spied upon him and reported that he worked with "retorts, filters, and small gleaming instruments" long past the midnight hour. Cicho had once been rich, but

having lost his fortune he now devoted all his time to doing something that would help others. "Man's duty is to help his fellow-man," he said. "I must find means of giving happiness to all mankind before I die."

In the meantime, Javanella, having learned the secret of making macaroni from the industrious Cicho by watching him work late into the night, sent word to the king through her husband, who was the cook's helper at the palace, that she could cook a dish which was so delicious that it deserved to appear before the king. On this report, he sent for her to prepare for him the dish, which, when he had tasted it, so pleased him that he begged for the receipt and gave Javanella a hundred pieces of gold. Her fame did not end here, for hundreds of people, both noble and peasant, thronged her rooms to buy her receipt, which she assured them had been given her by an angel in a dream. The king called the dish "macaroni," from the word *marcus*, meaning "a divine dish."

Finally, and still ignorant of the woman's treachery, Cicho, having completed his experiments, was ready to reveal his secret to the world. He went out of his laboratory to take the air, and as he passed along the narrow street, he detected an odor like that of the dish he had discovered. He went into the house from which the odor came and, on making inquiries, was told that the woman was cooking macaroni, the dish that Javanella had taught her to make—"she who had been taught by an angel in a dream." "The king, the court, and all Naples

are eating it," she said. Disheartened and in despair, Cicho returned to his laboratory, broke his pots, and burned his books and disappeared, never to be seen again. Javanella flourished for many years, but on her dying bed the agony of death forced her to confess that she was an impostor.

It is said that "in the little street of the Cortellari, in the rooms where Cicho labored for the good of man, on the eve of the witch's Sabbath strange sounds are heard. And there, so the soothsayers believe, the old man cuts and rolls his paste, and Javanella, lashed by demons, stirs red sauce with a cooking-spoon, while Satan grates 'Lodi' cheese with one hand and pokes the fire with the other."

While we are not sure that the Italians were the first to make macaroni, we know that at the end of the fourteenth century they were the only people who habitually used it, and apparently they were wise enough to keep the secret of its manufacture to themselves for a century at least. Then an enterprising Frenchman introduced it to his fellow-countrymen, and ever since France has vied with Italy in its manufacture. Within the last twenty years, an immense industry has grown up about Marseilles, which is now the center of the French macaroni trade.

That peculiar hard, glutenous wheat which alone is suitable for making the best macaroni does not grow in Italy. Russia, until the war, sent yearly more than 25,000,000 bushels of this cereal to the Italian and French mills for use in making paste flour. The semi-arid steppes of the great central plateau seem

especially adapted to the raising of macaroni wheat because, while there is a small rainfall, it comes mostly during the growing season. Some Mediterranean countries, especially Algeria, produce considerable hard wheat, a large part of which is used in the manufacture of alimentary pastes. The Durum wheats, now grown in the United States, but indigenous to Russia, are well adapted to the making of macaroni and other paste products, of which more than 225,000 tons were made in 1920 in this country. These Durum wheats have been most diligently studied by the Federal and State agricultural departments with a view to the adaptation to each particular climate and soil of the variety best suited to it. In appearance the tall stalks, as they ripen in our fields, with their broad smooth leaves and heavily bearded heads, look more like barley than ordinary wheat. On the eastern slope of the Rocky Mountains, where the rainfall is light although the soil is rich, the land is well suited to the growing of macaroni wheats. These alkaline soils seem especially adapted to the needs of the Durum wheats.

You wonder, perhaps, why we have to go clear back to the farm in talking about the manufacture of such a simple food as dried "alphabets," "shoe-strings," and tubes of flour paste, made mostly in the congested districts of our large Eastern cities. Some of the "paste" manufacturers have also asked this question of the country and have insisted that ordinary flour, or at least the richer protein portions of common wheat, would serve just as well for macaroni as the special Durum varieties. The fact, how-

ever, remains that there must be much gluten in an alimentary paste or in cooking it will get soft and soggy, and that only the Durum varieties of wheat are sufficiently rich in protein to make real macaroni.

The flour made from some of these wheats grown in North Dakota contains 16.5 per cent. of protein, while that made from ordinary wheat contains only 11.5 per cent. The wheats which are called *grano duro* or *grano semolino* by the Italians are, as has been intimated, richer in gluten than soft wheats. In this country we never buy *semolina* under that name, but in England and more especially in France the granular product made by coarsely cracking the wheat and sifting from it the fine flour—a product something like our “middlings”—is used directly for making porridge and puddings. This is the “mother material” from which macaroni is made. The Italians blend the various grades of *semolina* from the Taganrag wheat, a Russian variety, and in France some of the hard wheats from Russia are mixed with the native grain in making the pastes.

That was a memorable ride we took in a trolley-car from Sorrento, high up on the shoulder of a cliff overlooking the Bay of Naples, to Castellammare, and then along a swift roaring stream to Gragnano, the world-famous center of the macaroni industry. Across the valley to the north rose Vesuvius, always the center of any Neapolitan view; and below at the base of the volcano were the buried ruins of Pompeii. At Gragnano the macaroni-mills, clinging to the steep hillsides, remind one of the old grist-mills of this country. Everywhere, even in the village,

macaroni was in evidence, drying on shaded racks in the cottage yards along the highway.

It is not a complicated process, that by which the Italian makes his macaroni. A coarse meal is made by grinding the moist wheat between millstones and sifting out the fine flour. This meal is then kneaded into a stiff dough with hot water and placed in a sort of big steel "squirt-gun," the bottom end of which is closed with a bronze die called a *trafila*, perforated with holes. The form of the holes determines the variety of paste made—large ones with a center core for macaroni, smaller ones with small core for spaghetti, and tiny ones for vermicelli. The dough is squirted through this *trafila* by heavy pressure applied by a screw to a plunger that fits into the cylinder, and comes out of the bottom in continuous pipes or rods, as the case may be. In one Gragnano factory that we visited the machine consisted of two cylinders, one of which was filling while the other was being pressed out.

The Italians assert that only the best macaroni has sufficient tenacity to bear the process of "poling," that is, of being thrown over reed poles after the strips have been cut off below the cylinder. Inferior grades do not show the flattened pole-marks at the bend of the tubes because they have been laid flat to dry. In the yards and everywhere on platforms in the vicinity of the factory racks loaded with the macaroni drying in the sunlight are to be seen. The product is then placed in the cellar to allow the moisture to become more evenly distributed, and later dried for a longer time in the sunlight. This drying

or curing is a very delicate process, for if the product is too moist it will mildew or sour, and if too hot it will crack and become damaged in texture.

The method of air drying reminds one of the cod-fish drying establishments at Gloucester and elsewhere on our Atlantic coast, except that there is no "fish" odor to float away on the breeze and "give away" the character of the product.

The same general process gives us spaghetti, vermicelli, and not less than a hundred other varieties of paste products. I confess to some curiosity as to how the alphabetical macaroni, the seeds, stars, and animals were made, but it is all very simple. A cylinder and piston are used as in the macaroni-machines, but the openings in the die are of the particular shape desired, and as the tubes come through the die a set of revolving knives fitting close against the bottom of the disc cuts off thin sections which are the letters or other fancy forms. When dried in shallow pans the product is ready for use in soup and other combinations.

The expert knows very well what to look for in a good grade of macaroni. It is rough in texture, elastic yet hornlike, has a yellowish-white color, and breaks like glass. If boiled with water it swells to double its original size and is never sticky. Some idea of the water-absorbing property of dry macaroni may be gained from the statement that ten pounds will absorb thirty pounds of water during cooking. A good macaroni can safely be stored and keeps well. We sometimes say that "the proof of the pudding is in the eating," but with macaroni one

need not wait to taste his "pudding," for a good quality when boiled for twenty to thirty minutes in salt water shows each tube whole, tender, smooth, and not pasty.

That the tenacity or tensile strength of the pipes of macaroni is considered a proof of its excellence is well illustrated in the cut. Each of the venders would have us believe that his product will best stand the strain without rupture.

Although it will not entirely take the place of meat, yet its high protein content makes macaroni an exceedingly valuable addition to our dietary. As it lacks somewhat in flavor and is deficient in fat, the Italian epicure serves macaroni cooked with butter and flavored with some form of tomato paste.¹ Prepared with cheese, the nutritive value of the dish is still further enhanced, for cheese adds to the protein content and largely increases the fat. In fact, if prepared with the right mixture of ingredients, macaroni and cheese may be an almost ideal "balanced ration," for it can readily be made to contain the three classes of nutrients in just the right proportion best to satisfy the demands of the body.

Murillo, as long ago as 1650, in his world-famous painting, "The Brush Sellers," depicted the street urchins eating macaroni. Perhaps this is the way to get the flavor for the longest time, for the Italian usually eats it thus, taking up the macaroni on a fork and putting the lower end in his mouth, gently

¹ "Macaroni and tomato sauce" seem to be as closely associated in the Italian dietary as "ham and eggs" or "bread and butter" with us.

sucking in the long strings. "His whole soul and intelligence is concentrated on the pretty feat of transferring these tubes from his fork to his mouth." Some one has suggested that the Italians must have "reels" in their throats.

Should you desire to be more civilized, you may snarl the paste about a fork and then put the "roll" in your mouth, or of course you may have it cut in short pieces so that it can be more conveniently and elegantly eaten.

If we make a good quality of macaroni from Durum wheat in the United States, there is no reason why we should not supply the market for all these Italian pastes with articles of home manufacture, and even push the domestic product into foreign countries. We have the wheat, and we have the skill necessary to make a superior product.

There is little danger of adulteration in alimentary pastes except by the addition of coloring matter to some of them to make them appear as though they contained eggs. Moisture in excess of the 13.5 per cent. allowed may occasionally be present, but as a rule the manufacturer does not care to take the chance that too wet a product will spoil before it is sold. Of course we may have inferior grades of macaroni made from flour that is not adapted to its manufacture, and until recently a lot of such pastes were sold to the American trade.

In the year ending June 30, 1914, just before the beginning of the war, we imported more than 126,000,000 pounds of macaroni and other paste products,

122,000,000 pounds of which came from Italy and the rest from France, Japan, Spain, China, and a small amount from other countries.

It is pertinent to ask: What is the United States doing to supply the demands of this country for macaroni? One has but to look at the list of over five hundred manufacturers in this country to be convinced that we are now taking care of the domestic trade, whatever conditions prevailed before the war. The Durum wheats of North and South Dakota, Montana, and Minnesota, and some Kansas hard wheats are used in its manufacture. In 1921 we imported only 1,586,225 pounds of macaroni.

CHAPTER III

THE NUT-GATHERERS OF SEMI-TROPICAL LANDS

THE boy who is fortunate enough to have been brought up in the country cannot resist the lure of crisp October mornings, when the frosty air is full of the odor of falling leaves and the rustling woods beckon him to gather the ripened treasures of the year. If he lives in New England or the basin of the Great Lakes, he watches for the opening chestnut-burrs, which are brought down by the skillfully directed club; he climbs the "shagbark" hickory-tree and shakes down or "poles" the brown nuts just ready to drop from their protecting shells; he searches beneath the dead leaves for the walnut or the beechnut. The boys who are raised in the great Middle West may not know the chestnut or butternut, but there are always plenty of black walnuts in their hand-staining and hazel-nuts in their mouth-puckering jackets. Then, farther south, where the 'possums fatten on persimmons, there are the wild pecans, which in recent years have been cultivated to good advantage in large orchards. These are some of our own native nuts, but all over the world in the forests are trees bending with their loads of these concentrated food products. Everywhere

The hardy nut, in solid mail secure,
Impregnable to winter's frost, repays
Its hoarder's care.

It is especially in tropical and semi-tropical countries, however, that nuts are most abundant, and so to obtain many of them we must go abroad, where sunshine is more abundant and the average temperature is higher than in most parts of our own land. In a few of our favored States some of the foreign nuts may be grown. It was California that took the lead some years ago in the raising of foreign nuts, and now she produces annually about 40,000,000 pounds of English walnuts, with quantities of almonds and filberts. This industry, which has sprung up within the last twenty-five years, has greatly increased the use of nuts in this country and has had its effect on foreign importations.

For Brazil-nuts we depend mostly on the South American states of Peru, Amazon, and Maranhao. For chestnuts we look to Italy, Spain, Portugal, and France; for filberts we go to Sicily and the country in the vicinity of Naples. We are supplied with the so-called English walnuts by France especially, although many come from Spain, Italy, Turkey, and even Chile. Cocoanuts and pistachios are grown in almost all tropical countries, but most of our supply comes from the West Indies, the Philippines, and the South Sea islands.

The reason that nuts stand transportation so well is that they are protected by hard shells from changes of climate and against rough handling. They keep well for several months, and are not readily adulterated, for they show their true worth, and a simple inspection will usually determine whether they are worm-eaten or old and rancid.

In October the imported almonds arrive in 110-pound bags; the Brazil-nuts in 200-pound bags; the filberts from Sicily in 220-pound bags and from Naples in 110-pound bags; walnuts of the Grenoble variety come in 220-pound packages, the Naples variety in 150-pound cases; and the Marbots, Cornes, and Chiles in 110-pound bags during the first half of November.

WALNUTS

Although several varieties of walnuts are native to the United States and grow abundantly in the woods and forests, there are some, especially the English walnuts, that until recently were all imported. We are familiar with the black walnut, a stately tree of our American woods, with its hard-shelled rich nuts, and its soft easily-worked wood so valuable for furniture and gun-stocks; we know the butternut, sometimes called the white walnut, a less stately tree and more limited in its habitat, growing more especially in the northern United States and in Canada.

The English walnut—why “English” no one knows—is supposed to have its origin in Persia, although it is famous as one of the native nuts of the mountains of Greece, Armenia, and Afghanistan. Turner wrote of it as early as 1551, “It is so well known in all countries that I need not it to describe.” The tree grows well in the southern part of England and in the Midland countries; it is an important tree in southern and southeastern France, and within the past few years has become a staple crop in southern

California. There is a Spanish proverb which runs: "A woman, a spaniel, and a walnut-tree; the more you beat them the better they be." But the Californians, even where they revere their Spanish heritage, have learned that the walnut-tree, at least, bears better the more carefully it is cultivated. These American walnut-groves are to the eyes of the traveler one of the most beautiful sights of California, for not even the prize orange-groves are more carefully cultivated, fertilized, and trimmed.

In the autumn when the nuts are ripe, they are picked like peaches from the trees, the husk is removed, and sometimes the inner shells are bleached with chloride of lime and polished with soapstone to give them a clean and attractive appearance. The walnut is very popular as a table nut and for confectionery. Who does not appreciate with Tennyson the "after-dinner talks across the walnuts and the wine"? An excellent, bland, edible oil may be expressed from them. Only negligible quantities of walnut-oil are made in the United States, however, as there is a good market here for even the broken kernels, which are the chief source of the oil abroad. In parts of Europe the walnut is produced so cheaply that the poorer qualities of the oil find their way to the United States and are at times sold for less than linseed-oil; and it may replace the latter to a small extent for some technical purposes. In connection with some of the California walnut-groves and to a greater extent in Southern France and Italy, there are a few green walnuts put up as pickles, but

apparently this dainty has never become very popular in America.

California, in normal years, supplies one-half of the English walnuts used in the United States and nearly one-half of the remainder come from France. The French nuts are known as "Grenobles." We also import walnuts from Italy, China, Chile, Turkey, Japan, Spain, and a few from other countries. Our total imports of walnuts, both shelled and unshelled, in 1914 amounting to 37,195,728 pounds, and less than half of these came into the country as shelled nuts. In 1921 we imported 47,000,000 pounds of walnuts.

FILBERTS; HAZEL-NUTS

All over the north temperate zone, in both America and Europe, especially in the more barren soils, hazel-nuts grow, or, as a very early writer expresses it, "Hazels above all affect cold, barren, dry, and sandy soils; also mountains, and even rockie ground produces them; but more plentifully if somewhat moist, dankish and mossie." The wild nuts in the United States are the legitimate loot of the small boy as he roams over fields and pastures in the early autumn, and well he knows where they are largest and most accessible.

But it is not the hazel-nut, which is for us a foreign food, that is largely imported, but a closely related form of the same family, the filbert. Since hazel-nuts were so broadly distributed and grow wild in so many regions, we should expect to find them in use

very early in history. Even in Shakspeare's day, they were well known, for we read that *Mercutio* in chiding *Benvolino* for his quarrelsome disposition says, "Thou wilt quarrel with a man for cracking nuts, having no other reason, but because thou hast hazel eyes; what an eye but such an eye would spy out such a quarrel?" We know that hazel-nuts formed a part of the food of the ancient lake-dwellers of Switzerland, as we find the nuts even now with the remains of their houses. They appreciated the excellent food value of the hazel-nuts and their richness in oil, and writers tell us that the peasants often roasted and ate the nuts.

The belief in the divining-rod of hazel goes back to Roman times and probably earlier. It is evident that the wood used was that of the hazel-nut and not of the native North American "witch-hazel," as some writers have mistakenly assumed. The efficacy of the divining-rod was in the fact that it had two forks which were loosely grasped by the hands in such a way that the other end of the stick might move freely downward when in the vicinity of mineral veins or a living water supply. Cornish traditions recite that the divining-rod or "dowsing-rod" is guided to mineral lodes by the pixies, the guardians of the treasures of the earth.

The name "filbert" is said to be a corruption of the word "full-beard," referring to the fact that the fringed husk or envelope extends beyond the cluster of nuts; hazel-nuts have the husks shorter than other members of this group of nuts. Of the two varieties, the "common" and "beaked," the former are more

desirable although rather smaller. The Kentish district south of London has become famous for growing both filberts and "cob-nuts." The latter are larger and of finer appearance. Here they are grown on small trees, which are kept closely trimmed so that they are only about seven feet high. A part of the crop is picked green for pickling, which, it is claimed, makes those that remain on the bushes larger than they would otherwise be. The nuts keep well, especially in dry sand; they yield more than 50 per cent. of a fine edible oil, which is expressed in European countries and sold as "nut-oil."

The Barcelona nuts are imported from Spain and are kiln-dried before they are shipped. Trebizond, on the Black Sea, is also a port from which many filberts are shipped. Most of the filberts which come to this country are unshelled and are from Italy, Spain, Greece, and Turkey. The total quantity imported in 1914 was 11,636,479 pounds. In 1921 imports amounted to 18,000,000 pounds.

PISTACHIO

The pistachio-nut is not so common in the American retail market as some of those previously mentioned, but is used in very appreciable quantities by confectioners and in ice-cream manufacture. Its use is confined to that of a dessert-nut. One cannot help wondering, however, if all the so-called pistachio ice-cream and candy he sees is really flavored and colored with this nut, which is so little in evidence even in the wholesale confectionery houses. Sometimes a very small quantity of pistachio is used in ice-

cream, and the color is "brought up" by the use of aniline green. The flavor, however, is not improved by this process.

The pistachio nut was known to the ancients, and it is said that this was the species of nuts included in the presents which Joseph's brethren took with them from Canaan to Egypt, when Jacob said: "Carry down the man a present, a little balm, and a little honey, spices and myrrh, nuts and almonds."

The nut grows on a small tree which is a native of Syria, but has been introduced into western Asia, the Mediterranean countries, the southern United States, and California. It is oval in shape and has a red pellicle, and the kernel is of a greenish color. The fruit is a drupe, produced in cluster, and easily separates into two halves. It is peculiar in that the color is due to the large green cotyledons which are attached to the radicle. The nut's flavor is very delicate and somewhat resinous, and its greenish color adds to its value for decorative purposes. It is usually salted while still in the shell, and in fact in some countries is dipped in sea water in the process of curing.

Pistachio-nuts of the best quality are imported from Syria, Persia, and Arabia. Considerable success has been attained in raising them in the warmer regions of the United States.

CASHEW-NUTS

Perhaps the most curious of all the tropical nuts, in its manner of growth, is the cashew. It is both a fruit and a nut and is a native of tropical America,

although it is now grown in the East and West Indies, in South America, and in the Philippine Islands.

The cashew grows on large evergreen trees, which are set about fifteen feet apart and begin to bear from the third year, continuing to yield profitable crops until about the fifteenth. The fruit is of a peculiar, somewhat pyramidal shape, and yellow and red in color. It has an agreeable, slightly acid, astringent flavor. At its outer or distal end it bears, pendant-fashion, a nut or seed, the nut of commerce, which is kidney-shaped and enclosed in a grayish-brown cellular coat. Instead of being inside the pulp, as in ordinary fruits, the seed is actually outside and exposed to the air.

The "apple" or fruit is rich in a milky juice. This juice, when fermented, yields a wine, which, upon distillation, gives a spirit similar to rum. In Brazil and India the nut and the beverages obtained from the fruit are very popular among the natives. The seed is roasted or pickled and has a delicate chestnut-like flavor. Before roasting, the nut contains a considerable quantity of the poisonous substance, prussic acid, but this is dissipated by the heating and a very agreeable flavor is developed. The cashew is considered a very delicate dessert-nut, and, like virtually all nuts, yields on being pressed a light-colored oil, similar to olive-oil. In India, before the war, cashew-nuts sold at \$8.50 a hundred pounds, and perhaps it is because of its high esteem in its native land that this nut has so far been seen but little in the American market.

SWEET ALMONDS

In the early spring the hillsides of Italy, Spain, and, in fact, most Mediterranean lands are pink with the petals of the almond-tree. It is Edwin Arnold who, in describing the tree, says:

Blossoms of the almond-trees;
April's gift to April's bees.

The passer-by, were he from a foreign land, would probably think that he was looking upon a peach-orchard, so great is the similarity. Not only are the blossoms of the peach and almond almost identical, but the green fruits are very similar, and only as they mature does the characteristic difference appear. In the case of almonds, we all know the pit is the edible portion, while with peaches the fleshy portion or pericarp develops into the luscious fruit. In the spring one of the standard dessert materials in almond-growing countries is green almonds. These are edible at a time when the fleshy portion and the shell can be readily cut with a knife, and the kernel is soft like an undried chestnut.

There are two distinct kinds of almonds, the bitter and the sweet, both of which are cultivated in southern Europe; but only the sweet almonds are edible, as the bitter varieties are poisonous and used solely for the production of bitter almond-oil and the expressed oil of almonds. Some varieties of the sweet almond have hard shells nearly as thick as those of the ordinary peach-pit, and these are seldom seen on the American market, as they cannot compete with the thin or paper-shell nuts.

The sweet almond is often named for the country in which it is grown, as the Valencia, Sicily, or Bombay almond. The nuts are also grown in Persia, which is supposed to be the country where the almond originated, Palestine, Syria, and all the countries around the Mediterranean Sea, China, and the Canary Islands. We are all familiar with the name "Jordan almonds" but are not sure whether this name comes from that of a variety introduced from the vicinity of the River Jordan or whether it is simply a corruption of the French word *jardin*, the garden variety. At any rate, Jordan almonds are a special hard-shelled variety imported from Malaga, in southeastern Spain, and having a very delicate flavor.

Just as this country is now growing part of its English walnuts, so some of our almonds are also being raised in southern California, and the pink of the almond orchards shades into that of the peach groves along many of the arroyos of that wonderful land of fruit and flowers. Almonds, shelled and unshelled, were imported during 1921 to a total amount of 25,000,000 pounds. Not only are almonds used as nuts, but they are ground into flour used for making biscuits and cakes and for the manufacture of almond paste and the delicious "marsipan" of Oriental markets. The oil, which is expressed either from the bitter or sweet almond by pressure, is a bland oil, of more agreeable taste than olive-oil, and may be used in cooking and for salads in the same way as olive-oil. The expressed oil must not be confused with the so-called oil of bitter almonds, which is not a fatty

oil but a poisonous essential oil containing 85 per cent. of benzaldehyde. Almonds contains no starch, but as they have as much as 50 per cent. of fat and 25 per cent. of protein they form a very concentrated food product.

BRAZIL-NUTS.

We have always regarded the Brazil-nut as a foreign product, and little success has attended the attempt to raise it in the United States, as the tree will not withstand this climate. It is a native of Pará, Brazil, and is now extensively cultivated in the Amazon valley and Guiana. The tree is gigantic, in keeping with the luxurious growth of the Amazon forests. At a height of fifty feet it is often fourteen feet in diameter, and it grows to an average height of one hundred and thirty feet. The nuts are found in a thick oval outer shell, which is divided into four compartments, each crowded full of nuts. This receptacle or pericarp is so heavy and solid that it requires the blow of a sledge-hammer to break it, and it is dangerous to walk under trees when the nuts are ready to fall. The fact that Brazil-nuts are so much more often rancid than other nuts has been attributed to their high oil content, about 65 per cent., but probably their long flat shape and brittle shells, which make them easily cracked, have a good deal to do with their poor keeping qualities. Imports for 1921 amounted to 40,539,897 pounds.

COCOANUTS.

No dream of the sensuous life of the natives in tropical lands is supposed to be true to life unless

it takes into account the fruits of the native trees, and especially the cocoanut-palm, which we picture as dropping its food "ready to eat" at the feet of the care-free natives. Francis R. Osgood puts it:

Oh, the green and the graceful—the cocoanut-tree,
With its stately shaft, and its verdant crown,
And its fruit in clusters drooping down.

The cocoanut grows all through the East and West Indies and in parts of China and Japan, but the South Sea Islands seem to be its special habitat. It is not surprising that it should be so widely distributed throughout the tropics, for when the nuts drop into the ocean they are light enough to be borne away by the waves, and the kernel is well protected from the action of the sea water by its thick fibrous cover. The nuts require little encouragement to sprout in sandy bays and on mud flats, and grow rapidly when they once get started. This scheme of nature for the perpetuation of the tropical plant is all well enough for her purposes, but man, even semi-civilized man, wants more definite results, and consequently the planting of cocoanut-groves in the tropics has for years been a regular industry.

What could be more attractive than an annual crop gathered from trees planted by one's father or grandfather more than fifty years ago! The cocoanut-palm comes into full bearing in its twelfth year, and continues to yield its fruit with very little cultivation on the part of the owner for half a century or more. A plantation once started insures a lifetime of ease and profit to the owner. It has been said that since this palm furnishes food, clothing,

and shelter to the natives, without it the coral islands of the South Seas would be an uninhabitable waste.

Not only are cocoanuts a staple food among the natives of the tropics, but cocoanut milk forms a pleasant drink and when allowed to ferment produces an intoxicating beverage. While the cocoanut is primarily valuable as the source of one of the world's best food-oils, the desiccated meat is used in our own country in very appreciable quantities in confectionery and cakes. Only the highest grade of sound nuts imported in the shell can be used for drying and shredding, and great care has to be exercised to prevent the development of rancidity in these products. The shells are removed from the whole nuts by being heated very quickly so that they expand and separate from the kernel and can be cracked off in pieces. The kernel is then punctured, the milk drained out, and the outer rind peeled off with sharp mechanically operated knives. Thus prepared, the meat is ready to shred or chip, and as soon as cut up the fine pieces are quickly dried at a low temperature or canned fresh.

Cocoanut products then, since the tree does not grow in continental United States although it produces well in some of our island dependencies, must be imported. We are taking advantage of the cheap vegetable oil to take the place of animal oils and fats, and with the recent scarcity of fats both in this country and abroad, cocoanut-oil is indeed a welcome addition to the food of the people. During 1921 eighty million cocoanuts were imported. Imports of shredded copra or cocoanut meats amounted to 35,391,584

pounds, while 188,203,350 were imported unshredded.

We should not forget that the cocoanut is only one of the products of the palm family. In the various tropical countries there are no less than six hundred varieties of palms. From some of these the natives obtain their starchy food, from others wine, or milk or sugar or wax and oil for lighting their dwellings. Linnaeus says, "Man dwells naturally in the tropics and lives on the fruit of the palm-tree; he exists in other parts of the world and there makes shift to feed on corn and flesh."

PEANUTS

The peanut, in spite of its appearance and name, is not a nut at all. It is really a legume, to which family the peas and beans also belong, but unlike other beans the fruit ripens beneath the ground. The Latin name of this plant is *Arachis hypogæa*, which means growing below ground. Although its blossoms, little, yellow, pea-like flowers, are produced on the stem above ground, as soon as the petals have fallen off the embryo fruit burrows under the soil and there matures. Chemically the peanut has a just claim to be classed as a nut, as it is very rich in both proteins and oil.

The origin of the peanut is unknown, but probably it was a native of tropical America. It was introduced into the United States in the early colonial days, but not until 1870 did it become of commercial importance.

For many years the entire supply of "ground-nuts," as the English call them, was of domestic

origin, and only in recent years, since our commerce with the Orient has developed, have we been importers of this commodity. During the calendar year 1921 we obtained from foreign countries 4,523,841 pounds in the shells and 35,640,121 shelled. These latter are largely used for making oil.

Abroad, peanuts are little used except as a source of oil, although small quantities do find their way into confectionery. In the United States the situation is just the reverse. Virtually all the nuts imported with the shell still on them and some of those which are decorticated find their ultimate consumption in peanut-butter, roasted peanuts, and various confections such as cracker-jack and peanut-brittle. Even our domestic crop goes principally to the "shellers," and the oil mills get only the surplus and low grade stock.

From the tropics to as far north as the city of Washington peanuts grow and produce commercial crops, but they require warm climates and light soil. For more than a century the "coasts of Coromandel where the early pumpkins grow," Mozambique, Rufisque, Gambia, and more recently China have supplied the European oil-mills with peanuts. Seldom were these nuts in satisfactory shape for eating, and it is therefore little wonder that abroad one almost never sees a peanut-vender with his whistling cart at the street-corner or finds peanut-butter on his sandwiches at the railroad restaurant. In China the nuts are usually shelled by hand instead of with a flail as in parts of India, or by soaking with water as on the Coromandel coast, and therefore the Chi-



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COCOANUT HARVESTING



Courtesy U S. Department of Agriculture

COCOANUT-PALM



Courtesy World's Commercial Products

OLD OLIVE-TREES



Courtesy World's Commercial Products

PREPARING PALM-OIL ON THE GOLD COAST

nese nuts stand the ocean voyage far better than the broken or water-soaked ones from other countries.

Almost all of our peanut importations originate in China, and to some extent therefore the Southern peanut-grower is a competitor of the Chinese. Strictly speaking, however, he is in little danger from foreign competition at the present time, but he may be when Yankee methods of producing and shelling peanuts have been introduced into the Orient.

CHAPTER IV

THE EDIBLE OILS PREPARED IN NATURE'S STOREHOUSES

IN her plan of conservation, nature has not only laid up a great store of starch in the grains and roots, and of sugar in roots and stems and in fruit and plant juices, but she has also provided a storehouse for vegetable fats in seeds and nuts. As many of these grow abundantly in foreign—especially in tropical—countries, we have always imported the products in large quantities.

The most common foreign oils which we use are those from the olive, cocoanut, soy-bean, hemp, mustard, peanut, palm, poppy, rape, sesame, and castor-bean. A few of these oil seeds are grown extensively in this country, but most of the oils are imported to a greater or less extent. In 1921 the United States purchased abroad \$104,443,738 worth of vegetable oils.

Oleaginous fruits, such as the olive, cannot profitably be shipped any great distance to the oil-mills, because the oil in the ripe fruit rapidly becomes rancid. Seeds and hard-shelled nuts, however, which nature has put up in almost air-tight cases, will withstand ocean transportation and may well be brought to this country and the oil extracted here. Even ocean freights are high in these days, and as nut

shells are of very little value, few true nuts or peanuts are imported for oil making. It is cheaper to bring over the oil itself, even though the press cake, which is the residue after the oil has been squeezed out, may be worth more here than abroad.

With the oil-seeds it is different. Their coverings are a small fraction of the total weight and, being partially digestible, are a valuable part of the ground press cake as sold for stock feed. But because our own cotton-seed is such an admirable oil material and a by-product of the lint, as a matter of fact almost none of the grains that yield edible oils are imported.

From very early times the people of Asia Minor used the oil of the olive for food, for light in lamps, and for ceremonial purposes. Indeed, mention of oil is made as early as Genesis, Chap. xxviii, v. 18, and of olive-oil in the book of Exodus. The Phœnicians and early Romans carried olive-oil to distant countries, and considered it absolutely essential to their domestic life. So down through the poetry and religion of state and domestic life, vegetable oils have had a prominent place. The Psalmist's "oil of gladness" was that of the olive, not of the vine, and the Wise Virgins were provided with olive or almond-oil for their wedding-lamps, not with "Standard," as they are at the present time. The dwellers of the frozen North consume, of necessity, large quantities of animal fats to keep themselves warm, the bare-skinned natives of the tropics eat rancid cocoanut and palm-oils, but neither we ourselves nor other peoples of the temperate zone have ever been great

consumers of oils. Statistics show that larger quantities of vegetable oils are being used each year in this country, and this is due partly to the rise in price of animal fats, to the marked increase in the use of oils for salad dressings, and to the growing popularity of vegetable lard and butter substitutes for general cooking purposes.

Since there is a demand for some kind of fat in the diet, different nationalities supply this in their own way. In our own country, butter-fat has been utilized; in Spain every inhabitant eats as much as twenty-five pounds of olive-oil each year; in Africa they use cocoanut-oil, in China, the soy-bean oil, and in parts of Russia, linseed and sunflower-seed oils.

Probably the question most often asked of one who has a reputation for knowing about oils is: What is the best oil to use for food? The answer is very easy: The one you like best. All edible oils are almost completely digested by the normal individual, and there is, so far as we know, no appreciable difference between the food values of any of them. Whichever oil renders the food most palatable is the best for one to use if he can pay the price. As a rule the oil preferred by an individual is the one to which he has become accustomed. The Russian chooses his sunflower-oil; the Italian peasant prefers his rather crude, and often rancid, olive-oil to the blander and sweeter grades to which we are accustomed.

OLIVE-OIL

The gnarled branches of the olive-tree on the shores of the Mediterranean—in Palestine, in Egypt,

and in Spain and Africa—have, since the very earliest times, yielded a fruit that more than any other in those ancient times added to the comfort and luxury of the primitive peoples. The oil as a food and condiment, and the expressed oil for anointing the body or as a food, were a part of the necessary stores of every home. Somehow the olive-branch has always symbolized peace, ever since the days of Noah and his drifting craft, and the oil stood for ease and contentment.

To quote Marcus Aurelius: "So for the hair's-breadth of time assigned to thee, live rationally, and part with life cheerfully, as drops the ripe olive, extolling the season that bore it and the tree that matured it."

The olive-tree flourishes best in a limestone soil and where its branches are stirred by sea breezes, although it grows fairly well farther inland. There is a wild olive found growing in all the countries about the Mediterranean, but with greatest luxuriance on the rocky crags of the Grecian peninsula. From this probably the numerous varieties of the cultivated olive sprang. Such frequent reference is made to this tree and its products in the Bible and in the writings of the early inhabitants of Syria and Asia Minor that it must have had its origin in these lands. The Semitic tribes first learned of its value and distributed it to the Grecian archipelago.

Says Charles Dudley Warner, speaking of the shores of the Mediterranean, east of Jaffa, on the road to Jerusalem: "The rocks are silicious limestone, crumbling and gray with ages of exposure.

They give the landscape an ashy appearance. But there is always a little verdure amid the rocks, and now and then an olive-tree, perhaps a very old one, decrepit and twisted into most fantastic forms, as if distorted by vegetable rheumatism, casting abroad its withered arms as if the tree writhed in pain."

Some of the stories of the remarkable age attained by olive-trees are scarcely believable, but we know that there are gnarled and twisted trees still living that for centuries have yielded their crop for the "healing of the nations." Next to the mountains and the rivers, the olive-trees represent unchanging nature. We almost unconsciously put the olive-trees in the foreground of the landscape, as we picture the beauties of these semi-tropical lands. As Mrs. Hemans sings:

Fair land of chivalry; the old domain;
Land of the vine and olive; lovely Spain.

The trees are not tall, ordinarily not more than thirty feet in height, and are usually pruned to keep them low so that the fruit may be readily gathered. The long sharp-pointed leaves have a dull grayish-green color that adds little of life or brightness to the landscape, or, as Browning describes them,

The wan gray olive woods which seem
The fittest foliage for a dream.

The wood itself is greenish-brown, very close-grained, and much prized for ornamental turning on account of the fine polish of which it is susceptible.

Those who grow the olive tell us that it is best propagated by means of cuttings laid horizontally in

shallow trenches; these are covered with a few inches of soil and soon send up abundant shoots. Often, in the East, the trees are left to themselves, with scarcely any pruning; but for the best results they should be trimmed, pruned, and in the dry season supplied with abundant water. These latter conditions prevail in France and in some sections of Spain and Italy.

The flowers of the olive are inconspicuous, and the fruit, when it ripens, may be picked by hand for the more choice varieties, or the olives may be allowed to fall on the ground or shaken from the trees. The greater the care taken of the ripe olives in gathering, the finer the quality of oil produced from them.

The olive has been introduced into California and Arizona, the first grove being planted in San Diego in 1764. It was the custom of the early Spanish priests to plant at least one olive tree at every Mission no matter how small. To-day the most popular California variety is that known as the Mission olive which is, so far as we know, a direct descendant of these early Spanish trees. A census of California taken in the spring of 1916 showed nearly 805,000 bearing and over 515,000 non-bearing trees in that State. The estimated annual production at that time was 1,000,000 gallons of oil and some 1,800,000 gallons of pickled olives, and there has been a natural increase since then, due to the coming into bearing of the young trees not then old enough to produce any fruit.

American olives of which there are five common varieties, Mission, Manzanilla, Ascolan, Serillano,

and Nevadillo Blanco, are much better suited to pickling than oil production, as none of them contain more than 30 per cent. of oil. European olives on the other hand are usually of a higher oil content, up to 50 per cent., but not so large or "tasty" as our own.

For the manufacture of olive-oil the ripe or nearly ripe fruit is preferred, as the percentage of oil present in the flesh increases rapidly from the time the pit is formed until the fruit is nearly mature. We speak of the oil in the flesh, as little study has ever been made of that in the pits, although these do contain from 2 to 5 per cent. of oil and are often crushed and pressed along with the pulp.

The more primitive method of extracting the oil is by the use of a rough mortar, as in Africa, or by hand presses, but the modern methods in use in southern Europe and in California call for heavy hydraulic presses. The olives are crushed in immense flat pans by heavy wheels, which roll around continuously until the whole mass is pulped. This pulp is then put into heavy sacks or cloths and piled up on wooden grids in the press. The first pressing oil, known as the "virgin" oil, is of the best quality. When no more oil can be extracted in this way the pomace is removed from the press, reground with water, and again pressed to obtain a second grade of oil. A third and even a fourth pressing is made in the Continental mills after mixing the mass with hot water, but the product thus obtained is suitable only for technical uses.

If you are fortunate enough to have a chance to visit the olive-oil dealers or manufacturers in some Italian city, as in Genoa, Pisa, or Lucca, you will find that they have an immense stock of oil from various plantations, which is stored in deep cement cisterns below the floor of their warehouses. Here impurities, bits of skin and gelatinous matter, settle out, so that the pure oil can be drawn from the surface to be put into cans for shipment. Dealers also frequently blend the oils from different sources and, after clarifying and filtering them through a filter press, put up their special brands in tin or glass receptacles. These are labeled with trade names which indicate their quality or grade. Often as many as four grades are put up at the same establishment. The oil is then shipped to importers or brokers in London, New York, or Baltimore and in South America.

Since there is a great demand for pure olive or "sweet-oil" all over the world for salads and various culinary purposes, the supply scarcely comes up to the demand, and there is a temptation to "piece out" the stock by adulteration with cottonseed, sesame, corn, peanut, or poppyseed-oil. All the oil which we import is examined by chemists of the United States Department of Agriculture before it is put upon the domestic market, and, since the enforcement of State and Federal food laws began, seldom is adulterated. Imports of olive-oil during 1921 were 6,628,099 gallons, with Italy as the chief country of origin and Spain in second place.

RAPE-SEED OIL.

One of these oils which we have always imported for domestic use is colza or rape-seed oil. Most of this comes to us from France and England and the Orient. The total amount in 1921 was 953,589 gallons. The bulk of this importation, however, is used for technical rather than food purposes. Rape-seed is grown in India, China, France, Germany, Belgium, and Russia—more particularly in the Baltic regions. The best results are obtained by planting in the autumn and allowing the young plants to grow during the winter. The tops, before the flower stalk appears, may be eaten off by cattle without injury to the plant and are found to be an excellent fodder. The plant grows well in the United States, and the oil might be produced here, but we have never thought it worth while to raise the seeds for oil purposes.

The crushed seeds are “cold pressed” for high-grade oil, and then the first press-cake reground and heated in a steam-jacketed pan for a second pressing, which yields a lower grade of oil. The oil still remaining in the press-cake can be extracted by the use of some solvent such as gasolene or carbon bisulphid. Since the crude oil contains considerable mucilaginous material, for culinary use it must be refined by treatment with caustic soda or at least clarified by fuller’s earth, which is afterward filtered out carrying with it some of the coloring matter and gums. Colza-oil is of a light yellow color and has an agreeable taste. It is used as an edible oil, more

especially in India, and elsewhere by confectioners to replace more expensive oils.

MUSTARD-SEED OIL.

The use of mustard-seed as a condiment dates back to the time of George I, when a Mrs. Clements, in Durham, England, hit upon the plan of grinding the seed in a mill and sifting the powder from the hulls. The flavor was agreeable to the king and of course at once became popular among the good livers of that time. The mustard flavor is even to-day most highly appreciated by British cooks. As the plants, both white and black mustard, grow readily throughout the temperate zone, mustard might be raised in this country in sufficient quantities to supply all our needs. In California the mesas are yellow in the spring with wild mustard, and one variety known as the charlock is a most objectionable weed in the flax-fields of the Northwest. Mustard has, however, been raised more abundantly in England and on the Continent, and the seed or the prepared condiment, with the stamp of a well-known English firm, has been imported for many years.

It has been observed that for its best development and finest flavor the mustard needs a moist, foggy climate, and so we find districts in Poland, in Essex and in Cambridgeshire, England, and in Holland, where the mustard grows to the greatest perfection. Too much sunshine as the crop is ripening results in a product that is too strong to be used. Here again it is a fine delicate flavor, after all, for which the public pays the highest price. It is evi-

dent that there are "mustards" and "mustards."

In addition to a volatile oil which imparts to mustard its flavor and gives it the property of producing blisters on the skin, the seed contains over 30 per cent. of a bland, almost tasteless oil. This is partially extracted by pressure from the warm mass of ground seeds before the condiment is prepared. The oil can be used for culinary purposes, as a salad-oil, for burning in lamps, or for making soap. With the advent of corn-oil, peanut-oil, and the oil of the soya-bean on our markets, the oil of mustard has become of less importance, although that obtained as a by-product of prepared mustard finds ready sale at good prices.

POPPY-SEED OIL.

It is not only "where poppies grow in Flanders field," but in many other parts of Europe, Turkey, Persia, India, and China that the seeds of the poppy are used for making a valuable and agreeable food oil. The lower grades are used for industrial purposes. There is no reason why such an oil cannot be recommended as a valuable addition to our list of salad and cooking-oils, although at present we import it almost entirely for use in special paints and other technical purposes. It is not, however, probable that in this country, with our abundant corn, cotton-seed, and peanut production, poppy-seed oil will be extensively produced.

SUNFLOWER-SEED OIL

Although the sunflower has been grown in many of the States of the Union and utilized for feeding

poultry, but little attention has been paid to its seed as a source of oil. The seeds contain 22 per cent. of a mild, light golden-yellow oil suitable for use as salad-oil without any refining, when obtained by cold pressing. The people of southern Russia particularly, and to some extent those of Hungary, Italy, and China, not only eat the seeds raw or roasted, but make from them large quantities of oil for domestic purposes. In the Russian quarter of Los Angeles, one will find in the candy-shops little sacks of parched sunflower seeds which the children buy instead of peanuts. If it were not for the enormous amount of shelling required to get a good-sized taste of the tiny kernels, we should be inclined to prefer sunflower seeds ourselves, as they are certainly delicious. It is improbable, as noted above, that the sunflower seed will be utilized here, except perhaps locally, for making a food oil, but serious efforts have been made by the United States Department of Agriculture to encourage the growing of this seed as the source of a technical oil.

SESAME OIL

It was by the use of the word "sesame" that *Ali Baba* opened the cave of the Forty Thieves, according to the "Arabian Nights." The Orientals believed that sesame was created by the god of death, and so sesame is mixed with rice and honey in the cakes offered to the dead, which the Orientals believe will secure to the departed admission into heaven. In India, China, and Japan sesame is an important field crop. Here labor is cheap, and the

hot climate and abundant seasonal rains are adapted to the growth of the plant. The seeds are readily shipped to western Europe, where most of the oil of commerce is actually made. This seed, known as *ajahi*, is produced in large quantities in northern Mexico and in a small way imported and pressed by one or two of the Texas cotton-oil mills during their off seasons. In Turkey, and of course among the Turks and kindred peoples of New York City, the sesame seed is used as the basis of a sticky confection called *halva*. This *halva* is a mixture of sesame seed and honey, or should be if genuine, but we have seen it made of peanut-flour, a little sesame-oil, and a few seeds and glucose.

Sesame-oil is considered on the Continent one of the finest of the salad-oils and when made from clean, sweet seed needs no refining to make it a delicious, bland salad or cooking-oil. Germany and Holland require all margarin to contain a certain minimum amount of this oil, not that its addition to the butter substitutes improves them especially, but because, owing to its characteristic color reaction when mixed with hydrochloric acid and a little sugar, it can be readily detected. The presence, therefore, of sesame-oil makes the food inspector's job in these countries, so far as margarin is concerned, an easy one.

SOY-BEAN OIL

There is a wonderful bean, first grown in China and Japan, which has added many valuable food materials to those available for man. This is the soy or soya-bean. It has been known as a staple food

in the Far East for probably five thousand years, and at the present time large shipments of this bean and its oil are made from Manchuria to America. Although it was introduced into the United States as early as 1804, it did not become an important crop until recently, and it is to-day grown more as a forage than as an oil crop. Soya-beans will grow wherever Indian corn will flourish, although it seems better adapted to the Southern than the extreme Northern States.

The oil obtained by pressing the beans is bland but of a characteristic beany flavor, which, however, can be removed by modern deodorizing processes. While the major portion of the 195,800,000 pounds of soya-bean oil imported in 1919 was used in paint and soap, appreciable quantities are known to have been used in cooking compounds.

Incidentally, it is interesting to see how much use is made of the soy-bean by the Orientals. Mixed with rice, it makes a fairly well-balanced ration, for it contains an abundance of both protein and fat. Below are mentioned some of the soy products which are in common use and show the ingenuity of the people of China and Japan: a soy sauce made from fermented beans and wheat-flour; a bean cheese, rich in protein and fat; *natto*, which is made into small cakes and fermented on straw; *miso*, made from boiled beans, rice, and brine; and soy milk, made from boiled beans beaten to a pulp, so that considerable vegetable casein passes into solution. About the only one of these that we Americans are acquainted with is the soy sauce used liberally in Chi-

nese restaurants and as a basis at least for a famous English sauce served almost universally at the best hotels with roast beef and steaks.

PALM OIL; PALM-KERNEL OIL,

The fortunate people who dwell in Western lands can hardly appreciate to what extent the natives of tropical countries are indebted to the various species of palms for clothing, food, drink, building-material—in fact, for whatever makes existence possible. Whittier, in describing the palm-tree, truly says:

To him the palm is a gift divine,
Wherein all uses of man combine,
House and raiment and food and wine.

Among the numerous species of the palm that grow wild, in virtually the entire habitable portion of the torrid zone, are many which bear fruit rich in edible oils. Perhaps the most interesting of all of these is the oil palm, *Eloeis guineënsis*, which gives us two distinct kinds of oil. This tree is indigenous to West Africa and flourishes in a belt some three thousand miles in length from Gambier to Angola. Some idea of its value to the natives may be obtained from the fact that in 1918, 295,000 tons of the little palm-kernels, about a million of which are required to make a ton, were imported into the United Kingdom. There are only a very few fruits which contain, in both their fleshy portion or pericarp, and their pits or kernels, commercial quantities of oil, and the oil-palm is the most important of these. The fruit grows high up on the feathery top of the trees in huge bunches that weigh from fifteen to

fifty pounds, and consist of one to two thousand individual seeds. They ripen nearly all the year round, although during the three rainy months there are fewer seeds produced.

From the bright red pericarp of the ripe fruit, which has been very aptly described as resembling a mass composed of equal parts of "cocoanut matting and axle-grease," the natives obtain about 60 per cent. of its weight of beautiful palm-oil. In the preparation of this oil, nearly all of which is still made by the crude native methods, the ripe fruit is first boiled with water in large iron kettles to soften the pericarp. During the process a little oil is liberated and floats on top of the water, from which it is skimmed and, if from fresh fruit, saved for the maker's own use. This so-called "chop-oil" is nearly free from acidity and really quite palatable. The fruit, when well softened, is taken from the pot, beaten in large wooden troughs, made often of hollow logs, and again put back into the pot and boiled. The major portion of the oil separates at this stage and is skimmed off, settled, and put in casks for sale to the English factor. The still greasy mass of fiber and kernels is wrung out by hand and often rinsed once or twice, much as we would wash clothes, to remove as completely as possible all the oil.

The little nuts, the pits of the fruit about the size of a hazel-nut, are picked out and dried for several days in the sun until the kernel has become loose in the shell, then cracked, one at a time, between two stones by the women. One million to a ton, nearly 300,000 tons shipped in one year to England alone!

Just think of the noise of pounding there must be at times in those African villages! The dried kernels, which must be whole or they will spoil badly in transit, are now shipped largely to Great Britain, as there is a tax of two pounds a ton on all produced in British colonies and exported outside the kingdom. The kernels, which contain some 50 per cent. of oil very similar to cocoanut-oil, are crushed and pressed in hydraulic, box or cage, presses. This kernel-oil, which very closely resembles the better known cocoanut-oil, is used principally in the manufacture of vegetable butter substitutes commonly called nut margarins.

Yellow palm-oil, which is made from the fleshy part of the fruit, has not as a rule been used for food in civilized countries, although when properly refined and deodorized it is perfectly edible and of an agreeable flavor. We are best acquainted with it in this country as a technical oil which, until the war, was thought indispensable in the tin-plate industry as a flux over the back half of the coating pots. Confronted with the possibility that we might be unable to obtain the oil during the war, we discovered that hardened (hydrogenated) cottonseed-oil was as good or perhaps a little better in making tin-plate.

COCOANUT AND RELATED OILS

Another member of the palm family from which mankind, both civilized and savage, gets great quantities of oil is the cocoanut-palm. The growing of the nut and its uses have already been referred to.

In 1921 the United States imported more than

356,000,000 pounds of cocoanut-oil, and expressed from imported copra in her own mills almost as much more. When one considers that we get only about three ounces of oil from one nut and that to make the nearly 350,000 tons of oil we used, it took about four billion cocoanuts, he may get some idea of the world's annual crop.

Cocoanut-oil is not, at ordinary temperatures, a liquid, like many of the nut oils, but as it contains quite a large percentage of the solid fat called stearin, it comes into the market as a soft white solid of buttery consistency. On account of this large proportion of stearin, cocoanut-oil is often chilled and pressed to separate the solid and liquid constituents. The solid fat finds use not only in the nut margarins but also, when mixed with powdered sugar, as a filling in sweet wafers and some varieties of candy. The liquid "olein," as it is called, makes a very satisfactory shortening but cannot be used for "deep frying" because of its tendency to spatter and froth over.

Although before the war much of the copra trade went to England and the Continent, at the present time, on account of the demand for fats, especially to make butter substitutes, some of the cottonseed crushers are at times using their plants for pressing cocoanut-oil from the copra. This promises to be an important industry now that any prejudice against the use of cocoanut-oil as food for man—if it ever existed—has been removed by stern necessity. The making of food products containing cocoanut-oil, especially the nut margarins, is constantly in-

creasing, and the ingenuity of manufacturers in improving their products is second only to that of the advertisers in finding appropriate and "taking" names for them.

In Mexico, Central and South America, there are great forests of other nut-bearing palms from which small quantities of oil are produced by the natives. Of these the coquito and cohune nuts are imported to a small extent into the United States, and were it not for the great difficulty of cracking their almost steel-hard shells and cheaply separating the kernels, these nuts would materially add to the world's supply of edible oils.

SHEA-NUT OIL

In this list of oil-producers, the Shea-nut should not be forgotten. It belongs to the star-apple family and grows on a large tree in the wilds of western tropical Africa. If there were only railroads in this region to transport the nuts to the coast, large quantities might be exported. A hundred pounds of the nuts will, when treated by European machinery, produce forty pounds of the valuable oil known as Shea-butter. This, like palm-nut oil, is used by the natives of Nigeria and adjacent regions as we use butter in many ways.

CHAPTER V

WHY WE PRIZE THE CONTINENTAL CHEESE

HE who is not a connoisseur on flavor may express surprise that we on this side of the Atlantic should bring so much of our cheese from countries two to three thousand miles away, when we have an abundance of cheese at home, and the dairies of New York, Wisconsin, and other States are every year putting their prize cheese on the market; but it is all a matter of flavor. From the same pail of milk a score of different varieties of cheese may be made by different processes and under different climatic conditions. It is natural then that from the Swiss pastures, using the milk from cows that crop the Alpine flowers in the crisp mountain air, the dairyman can make cheese that rivals in flavor anything we can produce; or that the French peasants, with their hundreds of years of gathered wisdom, should have perfected flavors by cooking and storing and aging their cheese that we can but attempt to rival. We sometimes despise the humble molds, bacteria, and vegetable parasites that prey upon our fruits and berries and spoil them, yet it is to molds and bacteria of various kinds that we must give the credit of causing the ripening of our favorite cheeses and imparting to them the flavor so much enjoyed.

Cheese is in many respects an ideal "storage food." A food containing more than 25 per cent. of casein and 35 per cent. of fat is evidently highly nutritious. It is not strange that cheese was known to the people of remote ages. It was probably first made accidentally, just as was the case with butter. Who shall say that the use of rennet to coagulate milk was not due to the storage of milk in the fresh stomach of some animal? At any rate the curdling of milk and the bacterial activity that follows would be matters of ordinary observation, especially among nomadic tribes.

From the time when Abram "cut out" his cattle and sheep and camels from those of Lot and took the great cattle-range to the south, from the time when the Arabs sought the green oases for their flocks in the desert lands of western Asia, through all the history of these nomadic tribes, how important a food must have been this concentrated product! It does not melt in the torrid rays of the desert sun, age and bacterial growth only improve its flavor, and even in the hurried flight of the Bedouin raiders it could be packed on the backs of the beasts of burden and readily transported.

Cheese is of such great food value, and may to such an extent take the place of meat, that it seems strange that it has not been more extensively used as a staple food. One reason suggested is that there has been a notion prevalent that cheese is indigestible and therefore should only be eaten in small quantities as a flavor or appetizer with the dessert. As Shakspeare says in "Merry Wives of Wind-

sor," "I'll make an end of my dinner, there's pippins and cheese to come." Careful experiments made in this direction by the United States Department of Agriculture and elsewhere show that, on the contrary, cheese can be used in liberal quantities as a part of the diet without producing any disagreeable symptoms. It should not be forgotten that the whole process of digestion of cheese does not take place in the stomach, for the fat and any undigested casein is taken care of in the intestines, and there is no evidence to show that any disturbance in those of us who have normal digestion occurs from the moderate use of cheese.

As we have both mild and highly flavored varieties of cheese, the former are usually selected to form an important part of the diet and the latter to improve the taste of what are otherwise somewhat tasteless dishes.

It is true that there is a variation in the methods of making different grades of cheese, but the general plan of coagulating milk, either hot or cold, of allowing the curd to drain or of pressing it, and of storing under special conditions is the same for Continental cheese as for ours.

We commonly classify cheese as either hard or soft. The difference between the two groups is largely due to the methods of manufacture, and especially to the fact that much of the whey is pressed out of hard cheese and not from soft. Of the hard foreign cheeses we are more familiar with the English cheeses of the Stilton and Cheddar type, the Schweitzer or Emmenthaler of Switzerland, the

Edam and Gouda of Holland, the Parmesan and Gorgonzola of Italy, and the Roquefort made in France. Of the soft cheeses imported into this country the most common ones are the French Camembert, Gervais, and Brie, the Swiss Neufchâtel, and the Belgian Limburger.

The last year before the war (1914) the United States bought 63,800,000 pounds of cheese from Europe. Of this 26,500,000 pounds came from Italy, 22,500,000 pounds from Switzerland, 5,500,000 pounds from France, and 3,700,000 pounds from Holland. This importation was almost entirely stopped during the war, but Continental cheeses are now beginning to appear again on our market. Our 1921 imports were 36,866,404 pounds. The greatest quantity came from Italy. Argentina, Switzerland, France, and the Netherlands followed it at the head of the list.

In 1921 the United States exported increasing quantities of cheeses of foreign types. This is especially the case with Roquefort, Camembert, Gouda, and Edam. These cheeses imitate closely those made abroad, and find a ready sale there on account of the scarcity of the home-made product. Cheeses of the *Cheddar type* were the first to be made here.

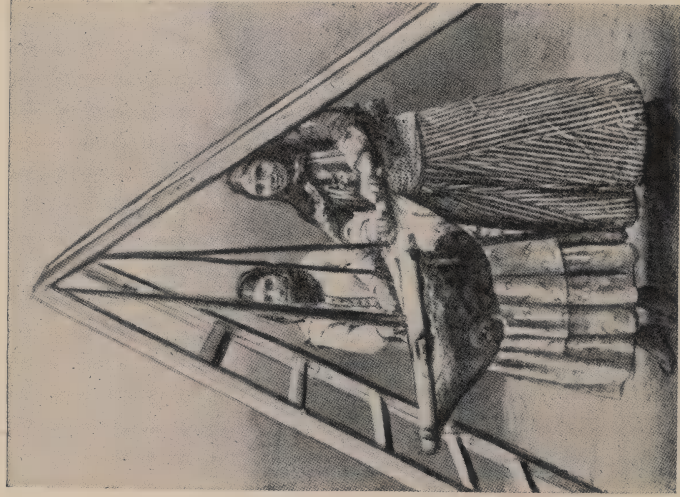
ENGLISH CHEESE.

The English cheeses imported in 1914 amounted to only about 335,000 pounds, and these were chiefly of the Cheddar and Stilton type. The same year we sent to England over 530,000 pounds of American cheese, largely Cheddar, and in 1920 over 5,000,000



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EDAM CHEESE MARKET



MAKING LEBEN



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MILKING GOATS IN PALERMO

pounds. The Cheddar is made abroad in the same way as in this country as a factory cheese, with a heated curd, which is submitted to considerable pressure. Stilton cheese comes from Leicestershire and adjoining counties. It is made from whole milk, sometimes with the addition of cream, and is not pressed or colored. In the process of ripening, the cheese becomes permeated with the spores of *pencilium glaucum*, which produces the characteristic blue mold.

SWISS CHEESE

Formerly the largest quantity of cheese coming to the United States was imported from Switzerland; the kind most in favor was the so-called *Schweitzerkäse* or Emmenthaler. This, when made in a similar way in France, in the Jura Mountains, is known as Gruyère. These cheeses have been made by the peasants in the mountains of France for several hundreds of years. This is the cheese that you see piled up in the markets of these countries like so many cart-wheels. They weigh from sixty to 220 pounds, and are often four feet in diameter and six inches thick. This type of cheese is known by the large holes scattered through it, although a "blind" Swiss cheese, without eyes, is often made and is just as genuine. Cheese made in the United States by the same process is known as domestic Swiss.

In the early summer, on an appointed day, the cattle in a mountain valley are gathered long before daylight, to be driven to "the Alp" for the "summer pasture." In order that they may not be lost in

their wanderings upon the mountain-side each cow is provided with a bell, some of the bells being very large and giving forth loud and raucous notes. If you are in one of those Swiss villages at the time you will be awakened by the "lowing of the kine" and the "inharmony" of the bells, the sounds coming from all directions as the cows are collected from the hillside and driven to the meeting-place. It is a weird and wonderful sound which you will never forget. The herd is slowly driven up the steep valleys and over the lower pastures until it seems that they would stop for summer forage just below the snow-line. They are herded in the best pastures where the grass is fresh and the water abundant, and driven from place to place.

The cowherds who look after the cattle during the summer do not own them, but the milk from each cow is noted daily, and at the end of the season the cowherd, the cheese-maker, and the owner settle the account for the summer's labor.

Scattered about over the Alps you will see the little huts known as *speichers* where the cheese, made at the dairies, is stored until it is time to carry it back down the valley. These buildings are raised upon stone posts, the better to protect the contents from mice.

In different districts cheese of slightly different quality and appearance is made. The term "Emmenthaler" is applied to this cheese because it was first in the valley of that name that it was produced. Generally, whole milk is used in making this cheese, and it is coagulated with rennet at 135 degrees

Fahrenheit. The curd is broken up and put in molds to drain. It is pressed and salted and allowed to ripen from eight to twelve months. In the process of making and curing Swiss cheese, as the gases of decomposition and ripening accumulate in the casein mass, the characteristic holes are formed. It is important that the gas-forming bacteria do not act too soon, so the rate of ripening is regulated by the temperature, which is gradually reduced from sixty degrees down to fifty-two degrees Fahrenheit, and it is two or three weeks after the cheese is taken from the press before the cavities begin to appear.

Neufchâtel cheese, although originally made in Switzerland, is now produced in other countries, and quantities of "Neufchâtel style" cheese are manufactured in the large dairies of the United States. This is the soft cream-cheese, sold in cylinders about two and one-half inches in diameter and three inches high, weighing five or six ounces, and covered with tin-foil, which is so common at the cheese-counters of our markets. The curd is only slightly pressed in making this style of cheese, which, after being removed from the molds, is dried or cured on straw in a moist cellar for some four weeks.

A hard skim-milk cheese, also made in Switzerland, is known as Sap-Sago, and to impart to the product the desired flavor a species of Alpine clover is worked into the curd. This also gives a greenish color to the cheese, which is nearly always molded into the form of a truncated cone, about three inches in diameter at the base. It is a favorite material with the cook, who grates it into various dishes.

DUTCH CHEESE

To the traveler one of the chief show places of Holland is Edam, which gives its name to a cheese of that district. An excursion is easily made from Amsterdam to Edam, Hoorn, or Valendam by rail or steamer. The quaint architecture of these towns and the picturesque costumes of the peasants are a constant delight to the artist and the traveler. In Holland the annual production of cheese amounts to over 175,000,000 pounds, two-thirds of which is exported. On account of the importance of the industry the Dutch Government and the schools of agriculture pay great attention to getting the very best quality. In fact the government stamp can be affixed only to those cheeses that contain, in the water-free material, 45 per cent. of fat and which are made of unskimmed milk.

It is unfortunate that sometimes both in this country and abroad skimmed milk instead of whole milk is used in making the familiar "cannon-ball" style of cheese, which we have learned to prize for its flavor, and although such cheeses may be labeled to show they were made from skimmed milk, this practice lowers our impression of the fine quality of the genuine Dutch cheeses. It is said that the average fat-content of the cheese made by the Dutch farmers is more than 45 per cent., though some made in the factories is a little below this figure. It is not so much the loss of fat that we deplore as the loss of the fine flavor that goes with the whole-milk, full-cream product.

In making Edam and similar cheeses the whole milk is coagulated by rennet at a temperature of eighty-four degrees and is then left in the vat until it becomes very acid. The most important step in the process is perhaps the addition to the mass of some of the whey from a previous curd, to produce, by the bacteria which it contains, what is known as "slimy fermentation." The curd, after being broken up with knives, is poured into wooden or iron cup-shaped molds to drain and is afterward pressed slightly in salting cups covered with cups of similar shape. In salting and curing, a temperature of sixty degrees is employed in an atmosphere of eighty degrees of saturation. The cheese is turned and rubbed each day for a month with oil, and finally colored on the outside with carmine or with Berlin-red and litmus. When the cheese goes to market it is still far from ripe, and requires nearly a year of slow bacterial action to develop its proper flavor.

These cheeses are in great favor for dessert and for use with macaroni, and the shell, after the inside cheese has been removed, may be used very successfully several times for serving macaroni.

Another Holland cheese, made in Friesland, is the Gouda, which is quite similar in color and flavor to the English Cheddar cheese. This cheese, which is small and flat, is cured more rapidly than the Edam, weighs ten to twelve pounds, and is inclosed in a bladder or other animal tissue for protection.

ITALIAN CHEESE.

Once on a time there was a mouse.
To all terrestrial things he bade adieu,
And entered, far from mouse or cat or man,
A thick-walled cheese, the best Parmesan.

Says Signora Eva Mariotti in a recent article:

The subject of Italian cheeses, made in different cities, is fascinating. Cremona is almost as famous for her cheese as she is for her violins. Parma produces huge deep yellow forms called *Parmigiano* which we grate on macaroni. Urbino makes a small, round, white cheese, only to be had in spring, and inexpressibly good. A raw bean called *fava* is served with it at table. The English name for these beans is horse-beans. They come on the table in their long thick pods for each person to shell for himself. When cooked they become brown in color and have a bitter taste.

Milan, surrounded by her rich pasture lands, is the home of many varieties of cheese. Gorgonzola and Groiera are made there, and one called *Millefiori* (a thousand flowers), also *Stracchino*, yellow as gold and soft as butter, a queen of cheeses.

In Rome, we have the famous Ricotta, a cottage-cheese made from unsalted goats' milk. It is brought into the city every morning in reed baskets, turned out upon a board, the snow-white forms still bearing the impress of the basket, and looking very like piqué sunbonnets. Ricotta is eaten with pulverized coffee and sugar, or made into a pudding flavored with rum or *marsala*.

There are two provinces of northern Italy, Lombardy and Emilia, that have been noted for the quality of cheese produced. One of these is known as Parmesan, named from the district of Parma in Emilia. This is in the rich alluvial valley of the Po, in sight of the Alps and under the shelter of the Apennines. The Parmesan is made from partly

skimmed milk with a slow heat and the addition of rennet at 120 degrees Fahrenheit. The curd separates in small lumps and is broken up and colored and flavored with saffron before being put into molds. After drying for several weeks the outer surface is pared off and the cheese is brushed with oil.

The ripening of this cheese is a most important part of the process. Cellars and caves, where the temperature is very even, are used in ripening, and here the cheese is stored from one and one-half to two years. The merchants frequently buy up the cheeses from the peasants and store them until they are sufficiently ripened for use.

As this is a hard dry cheese, one of the common methods of using it is by grating. Sometimes the grated cheese is put up in bottles and sold as grated Parmesan. It is perhaps more popular in Europe than in America, and is used especially as a flavor and to add nutriment to macaroni.

It is to Lombardy, in northern Italy, that we must go to find the Gorgonzola cheese in its true home. This cheese is a rich and creamy product, in some respects similar to Roquefort, although milder and usually cheaper. It is also permeated by blue veins of characteristic mold (*pencillium glaucum*) which has much to do with the production of the pungent taste. In shape it is something like the English Cheddar cheese, and weighs from twenty to forty pounds.

This is one of the cheeses made by the "two-curd" process; that is, an old curd made one or two days

before it is used—and consequently very acid—is packed into the mold in alternate layers with a fresh curd. Under these conditions the blue mold grows readily at the junction of the two curds. Sometimes a mixture of moldy bread-crumbs is used to start the growth of mold in the cheese. Like so many of the Italian cheeses, this is also ripened in caves and cellars, where it is stored for several months at a temperature of fifty-five degrees Fahrenheit. When hard enough to transport, the cheese is sold to the merchant, who usually holds it under proper conditions for ripening for some time before marketing it. As a reddish fungus appears in this process on the outside of those cheeses believed to be of superior quality, the merchants sometimes smear on the outside a mixture of cheese flour and brick dust to simulate the color of the mold. Tallow and gypsum are also used in the coating to preserve the cheese.

The milk of the sheep is utilized in southern Italy, especially in the province of Calabria and as far north as Romano, for making the typical cheese known as *Cacio-Cavallo*. After making, it is filled into sausage-skins and slightly smoked. The weight is about three pounds. It may be eaten fresh, or if stored until it is dry may be grated and used as a flavor for soups and for macaroni. The people of Italy are noted for their thrift; they import those cheeses which are cheap for home consumption, and sell those like Parmesan which command a better price in other countries. In many of these southern lands the milk of the goat and the sheep is more important than that of the cow, for it is much more

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economically produced; 120,000,000 gallons of sheep milk is produced annually in Italy.

FRENCH CHEESE.

Of the soft cheeses that are imported, probably the one most in favor is the Camembert, known as early as 1791, when it was made by Marie Fontaine, in Camembert, France. Perhaps one reason why this district has become so famous for the production of this kind of cheese is that the temperature of central France, especially from May to September, favors its making and ripening. A stronger rennet is used in the manufacture in the winter than in the warmer months, and the best grade of cheese is made from whole milk, although occasionally some of the fat is removed.

The first curd, as there are generally two curds used in making this cheese, is filled with great care into cylindrical metal molds, which are placed on straw mats to drain. This curd has shrunk considerably by evening, when the second curd is added. This is a little richer than the first, and the union of the two curds is facilitated by slightly shaking the mold. The next day the cheese is turned and salted and set on a fresh mat to stay until hard enough to transfer from the mold to a straw mat in the drying-room. This room is well ventilated and screened from insects. As the ripening proceeds the molds appear, first white and later blue, and these assist in aging and curing the cheese. When the blue mold is abundant, the cheeses are moved to the curing-room, the temperature of which is maintained

at sixty degrees Fahrenheit, and here they remain until marketed.

The finished cheese is six to seven inches in diameter and one to two inches thick. There is usually a reddish-brown mold on the surface, and the interior is a soft buttery mass. When the cheese is used in a small family, to prevent its drying out before it is all eaten, the pertinent suggestion is made that the cheese be cut in two in the middle and that portions be taken from each part alternately, so that the cut edges can be brought together to prevent evaporation. Keep it in a cool place under an inverted glass.

Perhaps one of the best known of the French cheeses is the Roquefort, which is made from the milk of goats and sheep. This was originally made in the village of Roquefort, in southwestern France, but it was too much of a favorite to have its manufacture confined to a single city or district, and now it is produced throughout the departments of Aveyron, Gard, Hérault, Lozère, and Tarn. These are districts between the Bay of Biscay on the west and the lower Rhone on the east where the temperature and climate are especially adapted to ripening the cheese and developing the flavor that is so much prized.

Pliny says that the Romans, more than two thousand years ago, imported this cheese from France to add flavor to their banquets, and its fame has not decreased, for to-day half a million sheep are required to supply enough milk to cover the demand.

In making Roquefort the curds are placed in layers in a perforated tin mold about six inches in diameter

and pressed lightly at first, and afterward with pressure increasing from day to day. As the curds are put into the mold, some dairymen sprinkle moldy bread-crumbs between the layers. This produces in the cheese the grayish-blue mold which, as the cheese ripens, produces the characteristic flavor. It is said that the bread is generally made of wheat and barley-flour with the addition of whey and vinegar. This bread, which furnishes the ideal medium for the growth of the blue mold, is stored in a moist place for several weeks, and then the crumbs are in good condition to be used.

When the cheese is hard enough it is removed from the mold, bound with cloth, and put in a drying-room for about ten days before being removed to the caves to ripen. These caves or cellars are cut in the Jurassic limestone in the sides of the valleys and are carefully ventilated by currents of cool moist air. Here the cheese is left to ripen for about two months, and the surface is frequently rubbed with salt and scraped from time to time to prevent the mold from growing on the outside. The air in these caves is filled with the floating spores of the *pencilium glaucum*, and the cheese is perforated with long needles to allow this germ-laden air to penetrate to the inside of the cheese, for there the ripening must take place. During this process the protein is transformed into a fatty substance, giving the cheese a friable consistency. These cheeses weigh from four to six pounds when ready for marketing.

Another cheese not so well known as those previously described is the Pont-l'Évêque, a soft French

cheese. This is named from the arrondissement of this name, near Caen, in northwestern France, where the cheese is produced. The milk is set at a higher temperature, viz., eighty-eight degrees Fahrenheit, than that usually employed in cheese-making. The cheeses are molded in a rectangular mold four and one-half inches square and ripened in moist air at a temperature of fifty-eight degrees.

There is a soft cheese made in the province of Normandy in northern France that is very popular on the Continent, but it is not so common in the United States. It is known as *Port du Salut*. For a long time the Trappist monks of the village of Bricquebec, who originated the process of making this cheese, guarded their secret with great care, because they derived considerable revenue from its sale.

The milk is heated to eighty-six degrees Fahrenheit and quickly coagulated. It is then drained and pressed by hand into molds and allowed to ripen slowly in cellars at fifty-four degrees. When the process is correctly carried out, the cheese is filled with innumerable small holes made by the gas-producing bacteria.

When finally marketed this cheese is in the form of a circular disk about an inch in thickness with a firm tough rind, the interior of which is filled with a buttery mass having a mellow, nutty flavor and is in great demand by those who "know a good cheese."

Brie is a soft French cheese, twelve to sixteen inches in diameter and about an inch thick, made

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and ripened by methods similar to those used for Camembert. It is named from a district north and east of Paris. As the cheese ripens at from sixty-two to sixty-four degrees, a blue mold appears quite abundantly on the surface, and the casein is broken down to a soft creamy mass having a decidedly strong odor but a flavor which is much appreciated by connoisseurs.

One of the noted French cheese-makers was Gervais, for whom a well-known cheese was named. It is not often that an improved food product is named for a man, except when the name is used by a modern manufacturer for advertising his product.

BELGIAN CHEESE

The best known of the Belgian cheeses is the Limburger, from the province of that name, although it was first made in the province of Lattick. It is also made in Germany and in very large quantities in the United States, notably in New York and Wisconsin. The Munster and Backstein are two famous German cheeses made in the same way as Limburger and easily recognized at a distance because of their strong odor. Either whole or skimmed milk is used, and the curd is coagulated at a lower temperature than that used for ordinary cheese. The animal heat in summer is often high enough to curdle the milk. The curd is cut with great care so as not to break the butter globules, upon which the richness of the cheese depends. Perforated rectangular molds five inches square are used for draining the curd,

which is salted several times and slightly pressed between boards. The whey is, however, not completely expelled by this process.

The packages are put on edge in the curing cellar, just as bricks are piled to dry. They are rolled in salt daily, and the slimy moisture which exudes is rubbed off. This process closes the cracks in the cheese and tends to keep it moist. Just as the proteins of meat decompose as the meat becomes "high," so the proteins of the Limburger cheese break down into a soft material and an odor is developed which persistently sticks to those who use the cheese habitually. After curing for eight to ten weeks the product is wrapped in tin-foil and put upon the market. Says a well-known authority, "In consistence, content, and nourishment this is the richest cheese that can be made, but to the uninitiated a malicious, premeditated outrage upon the organ of smell." After all, *de gustibus non disputandum*.

ARGENTINA CHEESE

It would not be fair to leave the subject of foreign cheeses without mentioning the remarkable increase of the dairy industries that has taken place within the last few years in Argentina. In 1911 only 500 kilos of cheese were exported, while in 1917 the amount had risen to 2,728,400 kilos. Since the beginning of the World War Argentina exports of cheese have increased over 900 per cent. In 1920 more cheese was imported into this country from Argentina than from all European countries combined. The most popular brands were those used

for grating purposes, and cheeses of the Italian types.

The fact is that since 1913 the movement of cheese from one country to another has been entirely thrown out of its normal condition, and the equilibrium has not been reached since the war. We exported slightly more cheese than we imported in 1919, but it is probable that this is only a temporary condition of the market. In 1921 our imports were nearly 27,000,000 pounds and exports less than half this quantity, 11,700,000 pounds.

CHAPTER VI

CAMPING WITH THE ARABS AND PARTAKING OF THEIR FARE

THERE are some sections of the world that are "dehydrated." We call them deserts, but many of them are deserts only because there is not sufficient water. The soil and climate are ideal for the growth of fruits and vegetables. What was designated on the old maps as the Great American Desert is beginning to "blossom as the rose" under cultivation and intelligent irrigation.

These districts constitute the "dried fruit districts" of each continent. The prevailing winds, the height of the neighboring mountains, and a combination of meteorological conditions have produced these arid and semi-arid spots on the globe, and it is for man to encourage on them the growth of such cereals, fruits, and vegetables as can be adapted to their conditions. T. R. Smith calls attention to the fact that it is in these sections of the globe that the dried fruit industry has been developed. In Australia, Africa, Asia Minor, Spain, and Chile, as well as California, advantage is taken of sunshiny days and rainless nights to dry the native fruits to perfection. With the moisture eliminated, the fruit will keep in other climates and can therefore be exported all over the world.

It required the exigencies of the war to make us realize how much less it costs to ship fruits and vegetables without the water which they naturally contain. Millions of pounds of dehydrated vegetables were sent to the army overseas from British Columbia and the United States during the "late unpleasantness." Dried fruits and vegetables retain to some extent the vitamins known as "Fat Soluble A," "Water Soluble B," and "Water Soluble C," which are now regarded as so essential to health and the promotion of growth, especially of children. Although the fresh products are more valuable, the dried fruits and vegetables still contain a considerable quantity of these vitamins.

DATES.

No picture of the oasis of an African desert is complete unless it includes the feathery fronds and stately stems of the date-palm. We cannot do otherwise than associate the lithe and sinewy Arab and the brown and comely nomadic maiden with the camel, the fertile oasis, and a bunch of dates—the land of "creams and cordials and sugared dates."

It is only where the temperature is high, the rains scarce, and the air very dry that the date-palm will flourish. The palms may grow in other lands, they may beautify the landscape, their fruit may set and appear abundant, but it fails to mature except under these particular climatic conditions.

The ancient Assyrians thought much of this remarkable fruit and celebrated its cultivation and use in their mural tablets. It has been grown in the

Canary Islands, on the North African coast, and throughout the tropical belt of Asia in India. There are a few localities in the United States, especially New Mexico, Arizona, and the Imperial Valley of California, where the date is now successfully grown, but until the present time the area has been very limited. In a recent article in the "National Geographic Magazine" entitled "Here and There in Northern Africa," Frank Edmund Johnson, describing the date-palm, says:

The Arabs call the palm-tree "My Aunt" and say that it resembles a human being more than any other variety of tree. "Cut off its head and the palm will die. Its head likes sunshine and its feet (roots) like moisture." An old Arab legend runs something to this effect: "When Allah created Adam, a few grains of dust fell between his fingers; these grains made the palm-trees." Another legend has it that:

The emperor of Byzantium wrote one day to the Caliph Amor Ben El Khattab: "It has been told me that in your country there grows a tree that bears pods, the shape of which reminds one of donkey's ears; when these open they expose to view a substance of immaculate whiteness, as white as milk, which afterward becomes the green color of an emerald, then turns as yellow as gold, to redden at last like a great ruby. This fruit is said to have the sweetness of taste of cake made of honey and butter and can be dried and used as food by the inhabitants of towns or by travelers on their journeys. If this report is true, surely this is a tree from Paradise!"

Caliph Amor Ben El Khattab wrote back: "That which has been told you is true, O King. Allah commanded Meriem beut Omran (the Virgin Mary) to take shelter under this tree when Aissa (Christ) was born. Believe, therefore, in Allah and do not acknowledge any other divinity! God said to Meriem beut Omran, 'Go to the base of a palm-tree and thou shalt give birth to a tender child, and nourish yourself with the fresh dates.' If God had

known any better food, he certainly would have given them to Meriem when Christ was born!"

Mohammadens say all date-trees had their origin from the land of Hedjer, bordering on the Red Sea—the land of Pilgrimage—the land of the Prophet's birth.

The date-palm grows readily from the seed or from cuttings but does not begin to bear until it is ten years old. The crop gradually increases in abundance as the tree matures until at thirty to forty years of age it is in its prime; then as old age comes on above fifty, its crop begins to fail. The beneficent value of the tree is not however over, for some of the leaves are cut off, an incision is made in the trunk, and a pottery jar is hung under the incision to collect the sap which runs out. This juice, called *lagmi* by the natives, is rich in sugar and is a refreshing beverage. The juice is more commonly, however, allowed to ferment and furnish an intoxicating liquor which the natives think most delicious but which has not found favor with the European palate. The juice of other species of palms, especially the "toddy-palm," is utilized in many countries in the East for the production of alcoholic beverages such as "palm wine." This when distilled makes the drink called "arrack," a liquor as strong as whisky. The natives of these Oriental countries also boil down the juice until it crystallizes or granulates to make a "palm-sugar," which is known on the market as "jaggery."

Thus the palm has been justly called the "queen of trees," for it not only affords shade from the tropical heat, while its leaves furnish mats and fiber,

ropes and building material, but its juice is a valuable beverage and its fruit is a most concentrated and agreeable nutrient.

There are vast areas of northern Africa and western Asia which never would attract any inhabitants were it not for the fact that the date palm grows in the oases of this desert, and that camels thrive under these seemingly adverse conditions. In the hottest regions of the globe, even at a temperature of 125 degrees Fahrenheit, the trees will bear paying crops if their roots can find water, and they seem to have no objection to a very salty or alkaline soil; in fact they will grow where there is so much salt that scarcely any other plant will thrive. This sandy oasis soil seems never to wear out; the same lands are cultivated now as when the children of Israel wandered through the Wilderness. So valuable is this land that \$5000 in gold per acre is sometimes paid for it.

As the male and female flowers of the palm occur on separate trees, a few male trees are necessary to furnish pollen for the female trees. In order to fertilize the blossoms, a spray of the flowers of the male palm is fastened with a thread of palm leaf into each group of blossoms of the female tree.

In some parts of Africa, Egypt, and Arabia the dates ripen in August, in other sections not until later, and in Spain and Sicily the crop is not gathered until December. The bunches of fruit weigh from twenty to thirty pounds, and when they are ready for harvesting it is the work of the boys to climb the trees, cut off the bunches, and pass them down

from one to another, the boys clinging to the trunk all along its great length down to the ground.

The individual dates are then picked off the bunches by the women (see frontispiece), sorted for size and quality, dried in the sun, and packed into boxes of from twenty to thirty kilograms each for shipping. These boxes are tied on donkeys to carry to the village, and finally a caravan of camels is loaded to transport them to the nearest port. It is said that considerable ceremony attends the gathering of the dates, and that before cutting the clusters the boys in the tree and all the natives assisting join in a chant of thanks to Allah for having given them the harvest, and before they descend the boys lead in the invocation, "May Allah in his loving-kindness preserve this palm-tree from all harm, and permit it to bear a good harvest in the season that is to come."

To give an idea of the life of one of the oases, Mr. Johnson thus describes that of Tozeur, in southern Tunisia:

Eleven thousand Arabs live underneath the shadow of the palms of this oasis, which covers an area of about 2,200 acres, and 4,000 occupy small villages on the outskirts. Most of them were born and have always lived in this oasis, and when they die they will be buried in the desert sand near Tozeur. The oasis has nourished these 15,000 souls and many thousands more; their wants and needs are simple. Families composed of husband and wife, or wives, and three or four children frequently live on less than ten cents (fifty centimes) a day.

Their mainstay consists of dried dates and a few boiled beans, with a little pure olive-oil. At almost any turn of the road in the oasis one can buy from an Arab vender, crouched over a large "Standard Oil" can and fanning the live coals, a copious supply of beans, cooked until they

are mealy, and ladled out of the can boiling hot. One cent buys enough for a hungry man. Caravans of nomads come from far and near to buy the dates.

There are at least a hundred varieties of dates, but the finest of all are the Deglet Noor, growing in the depressions of the Sahara desert, with the sands drifting around their roots and their foliage bathed in reflected rays from the surrounding dunes. Other well-known varieties are the Tafilat from Morocco, the Menakher, a brown date from the Tunis Sahara, and the Rhais. The last are full of sugary juice and used by the Arabs for making date honey. The principal types of dates are the "sweet,"—the kind that is exported to us, the "mild sweet,"—usually eaten fresh, and the "camel" date, the most popular among the Arabs for general use, perhaps on account of its keeping qualities.

The ripe date is naturally rich in sugar and contains so little water that it does not require long drying like the more juicy fruits. If the weather is moist when the mature fruit is gathered, it is almost sure to ferment and a large proportion of the crop is often lost. That is the chief reason why a dry climate is best adapted to growing the fruit.

The speed with which ripening takes place, and the relative proportion of cane and invert or grape-sugar present at different stages of development, vary with the varieties of fruit. The more invert sugar present, the softer and more translucent the date and, as a general rule, the richer the flavor. Soft dates would, therefore, be by all means the most desirable were it not for the fact that they are some-

times sticky, hard to handle, and more susceptible to decay. The dates rich in cane-sugar, on the other hand, are dry and easily handled, but rather hard and comparatively tasteless. As dates when gathered are often very sticky, and the natives of some sections who gather them are not noted for taking frequent baths—the only baths ever taken, in fact, being “sand baths”—it is well to wash the dates before eating them.

Is the date a fruit? Not when one compares it with the peach, apple, or orange, which are little more than delicately flavored water, as they contain often less than 20 per cent. of nutritive material. In the date we have a fruit, which of course it really is, containing 50 per cent. of sugar, 11 per cent. of pectin and gum, and 7 per cent. of protein, or if we are looking for “calories” as a source of energy, the date as purchased in the American market gives 1450 calories, and without the stones 1615 calories a pound. Half a pound of dates with half a pint of camel’s milk is food enough for an ordinary meal. If we are searching for concentrated rations, what can make a better “traveler’s food” than pounded dates pressed into cakes! The splendid physique of the men and women of the nomadic tribes of Arabia may be partly due to their life in the open air, but their diet of dates and camel’s milk, with occasional fresh meat or dried fish, no doubt contributes largely to their fine condition.

More than 34,000,000 pounds of dates came to our shores in 1914, and of these 31,000,000 pounds came from Turkey in Asia and from other Asiatic coun-

tries. Nine-tenths of our dates come out of Turkey and Arabia through the port of Smyrna. In 1921 the American imports were 48,504,355 pounds.

Efforts have been made for several years to grow the date in the United States, because it has been recognized that there are a few localities where the climate corresponds quite closely to that of the Eastern date growing regions. This is especially the case in parts of Arizona and the Imperial Valley in the extreme southeastern part of California. The Department of Agriculture has also made elaborate experiments on the best methods of curing and packing dates. The American product is greatly superior in appearance to the Mediterranean shipments, but the quantity thus far grown is only sufficient to supply a limited market.

FIGS

Back to the earliest ages, back to that interesting region near what has been called the "cradle of the race," must we go to trace the origin of the fig. It seems to have been indigenous to Syria and Asia Minor, and even now, after the westward migration of nations, there are no better figs than those raised in Asiatic Turkey. From a strip of land near Smyrna, ninety miles long and three-fourths of a mile wide, comes the bulk of the dried figs brought into the United States. We have been importing nearly 20,000,000 pounds annually, and of these three-fifths come from Asia Minor and the next considerable quantity from Greece. We imported 38,705,943 pounds in 1921.

Fig-trees were very early carried westward along the shores of the Mediterranean, and it is interesting to discover that in the scientific name, *Ficus carica*, or the fig of Caria, it is acknowledged that the fruit came to the Greeks from one of the western provinces of Asia Minor—from one of their neighbors on the eastern shore of the Ægean Sea.

The Greeks were not content with the imported fig stock, however, and much improved its quality, so that the Attic figs early became celebrated along the southern coasts of Europe. To the Roman nobles the fig became an important luxury, and the common varieties were regarded as a staple food for their slaves. The excellent food qualities of this fruit caused its cultivation to be still further extended, and later Spain and the south of France were noted for the abundance and the superior quality of the figs produced. To-day both in southern England and in the milder climate of our Southern States, the fig is grown for its fresh fruit or for drying and preserving. In these more northern countries, however, it may at times require shelter against the extreme cold of the winter, and so it is very often planted in protected courts or against walls having a southern exposure. Our agricultural experts believe that the climate of the great dry interior valley in the east and south of California is better adapted to raising figs than that of Asia Minor, the original home of the fig, because in the latter there are heavy summer dews, and the autumn rains sometimes injure the crop.

The method of growing figs is comparatively

simple, after the requisite conditions are understood. The United States Department of Agriculture in "Bulletin 732" very thoroughly discusses these conditions. The trees are propagated by cuttings or layers. After being well rooted and set in the orchard, the young trees will begin to bear in two or three years. The Lab Inger, or Smyrna, fig is different from most plants in that it requires special pollenization to bring its fruit to perfection. The fertile or female figs are divided into two classes, the Smyrna requiring pollenization, and those sometimes called Adriatic figs, the fruits of which will mature without pollenization. As the Adriatic figs do not need artificial fertilization, they are perhaps the best variety to raise in localities where few figs are grown. Adriatic figs, for domestic consumption, canning, and preserving are successfully raised from the Carolinas to Texas, and are a favorite fresh fruit from the middle of July into September.

There is a very interesting insect called the "fig-wasp" that assists in the pollenization process known as "caprification." The natives of the fig-growing countries noticed long ago that to secure a crop of figs it was necessary to hang on the branches of the cultivated figs, limbs of the "caprifigs" or "wild goat" figs. They probably did not fully understand why this had to be done, but carried out the practice on the basis of their observation. Those caprifigs bearing only small flowers furnish the host for the fig-wasp. When the fruit of the male plant is about the size of a filbert, the *Blastophaga* or wasps deposit their eggs in it. The insect hibernates in the

fruit, and in the spring is ready to issue in time to pollinize the young fruit of the Smyrna fig. If the fruit is not thus fertilized it withers and drops off. The pollen is of course carried on the wings of the insect from the flowers with which it has come in contact. There is probably no other horticultural industry so closely dependent on a specific insect as that of fig-culture. After caprification the Smyrna fig changes its appearance, becomes smooth, and loses its gloss.

Fig-trees under ordinary conditions produce two crops a year. The first crop ripens in July and August, and the main crop springs from the axils of the leaves of the new wood and ripens in the late autumn. The fig ripens and matures on the tree. The smaller figs that fall are dry enough to keep readily, but the large ones must be dried in the sun for a day or two.

After washing, the figs are again dried in the sun, and it has been found to be good practice to press them into large boxes where they are allowed to sweat for some time to distribute the moisture and make the whole fig pliable and tender.

In packing figs in California they are first boiled in brine for a minute or two, to destroy the eggs of any insect which may have entered the fruit, and to prevent the figs from drying out too rapidly. The brine is not very salt—not salt enough to affect the taste of the fruit. The figs are then packed into boxes and the bricks thus formed are compressed into smaller bulk. Sometimes, for a fancy grade, the figs are flattened out with the finger and split so

as to fit the form in which the brick is packed. Another method of packing is to place them in rows in the cartons. This is a common method in Smyrna.

In the process of curing, the figs are in some localities exposed to the fumes of burning sulphur, so as to sterilize them and destroy the spores, fungi, and larvæ that may be present. They are afterwards treated with boiling lye, washed, and sun-dried. Some of the figs are also shipped to America in baskets, on strings, or in boxes.

Although we usually picture figs as the dried product, yet this is by no means the only way in which they are used. Our Greek, Italian, Turkish, and Spanish population would miss fresh figs if they could not find them in the market. On this account in many cities an excellent trade in fresh figs has sprung up. There is still some difficulty in getting fresh figs to the Eastern cities without too much expense for refrigeration. Only the finest quality of California or southern Smyrna figs should be used for shipping in the natural state, as the poorer fruit rapidly deteriorates.

Like the date, the fig is a concentrated food, provided by nature for the people of a dry, sandy, apparently inhospitable region, where long journeys must be taken with as little bulky food as possible, and where food and water are scarce. While fresh figs contain 15 per cent. of sugar and 1.5 per cent. of protein, the dried fig is one of the most concentrated forms of nourishment on the market, as it holds under its somewhat tough skin more than 51 per cent. of sugar and 3.5 per cent. of protein.

Besides its use all over the tropical and semi-tropical countries as a fresh product, and its exportation to every land as a dried fruit, the fig is too valuable not to be still further utilized. In parts of the Archipelago figs are mashed to form a kind of cake, which is used as a substitute for bread; and the ancients, as long ago as the time of Pliny, made a wine from fermented figs. As a gentle laxative, this fruit has been favorably known since early times.

There is no better illustration of what can be done in bringing foreign fruits to this country and growing them successfully than what was done through the efforts of G. P. Rixford, now of the United States Department of Agriculture, and the "San Francisco Evening Bulletin." After several failures they succeeded in September, 1881, in getting a shipment of 14,000 cuttings of the best varieties of Smyrna figs from the Mendere Valley in Asia Minor through to California in good condition for starting an orchard. The trees now growing throughout California and the Southwestern States are the result of this experiment. Some of the trunks of these trees are already three feet in diameter.

Adriatic figs have long been grown in America, being probably introduced all along the Pacific coast by the early Mission Fathers. There are more than six hundred species of fig-trees, but only a few of these bear edible figs. Some of the larger evergreen trees of the tropics and even one of the most important rubber-trees belongs to this family.

Before the war, we were annually supplied with

over nine thousand tons of dried figs from abroad, and California now furnishes six tons annually. A third of the domestic figs are of the Smyrna type, and the remainder are the Adriatic and Mission varieties. There is, however, a tendency to increase the quantity of Smyrna figs grown, as they are more satisfactory. Ultimately our markets should be wholly supplied with home-grown figs, to the exclusion of the foreign product. As an evidence of this tendency, it is stated that within the last two years fully ten thousand acres in the San Joaquin Valley alone have been planted with fig-trees. In other districts outside of California and Arizona, as in the Southern States, where the climate is not suited to the successful drying of figs, there is an increasing market for fresh figs for immediate consumption and for canning and preserving.

ST. JOHN'S BREAD, OR CAROB-BEAN,

The traveler in Italy or Greece will be impressed by the abundance of "locusts" (carob-beans) in the markets of the principal cities. He will be told that they are sometimes eaten by man but more frequently used as a food for horses and cattle. The pods of this legume grow on an evergreen tree that came originally from Syria. The Arabs, more than any other people, have used it as a staple human food, and its cultivation has been extended west on both sides of the Mediterranean as far as Morocco and Spain. In Sicily the natives make a syrup, and by fermentation an alcoholic liquor from the pods.

Since the pods are often used for swine's feed,

this bean has been called "swine's-bread" and is probably what is referred to in the parable of the Prodigal Son. Some have thought that the carob-tree was what was used by Moses when he sweetened the bitter waters of Marah.

The pods of the carob-bean resemble somewhat those of the honey locust that is so common in the United States. The seeds or beans are surrounded by a sweet mucilaginous pulp, which in this country is prized especially by foreign children as a kind of confectionery. The dried pods are a valuable addition to the food supply, especially in those lands where concentrated foods are demanded in the fitting out of caravans for the desert.

Dr. Jaffa of the California Agricultural Experiment Station has recently made a careful study of these beans. He finds that the pods, which are the valuable part of the product, contain 34.41 per cent. of sugars and 4.5 per cent. of protein. Large quantities of these beans are now shipped to the United States to be used in the preparation of cattle feeds.

POMEGRANATES.

The nomadic tribes of the Orient were long accustomed to

Pluck the Acacia's golden balls,
And mark where the red pomegranate falls,

for the pomegranate is grown throughout India, Persia, Egypt, and the Mediterranean regions. It probably originated in Afghanistan or northwestern India, and was known to the Hebrews, Egyptians,

and Greeks in very early times. In Greek mythology the pomegranate occupies a prominent place. One of their legends is that as Persephone was gathering flowers in a meadow with her companions the earth suddenly opened, and Pluto, the god of the dead, appeared and carried her off to be his queen in the lower regions. Her mother Hebe, goddess of agriculture, torch in hand, sought her throughout the earth, but not finding her forbade the earth to bring forth any increase until she had been found. So all that year not a blade of corn grew on the earth, and men would have died of hunger had not Zeus, seeing the situation, persuaded Pluto to let Persephone return to her home in the upper regions of the earth. Before letting her go, however, he persuaded her to eat of the fruit of the pomegranate, so that she could not stay away from him forever. Thereafter she spent half of each year with her mother, but the other half had to be spent with Pluto in his underground kingdom.

We read that when the Persians under Xerxes invaded Greece there was one battalion which was known as the Pomegranate Brigade, and these soldiers, who were Xerxes's own bodyguard, carried spears with golden pomegranates on the lower end. The Israelites learned to like this fruit while they were in Egypt, and during their wanderings in the wilderness mourned for the "fig, the wine, and the pomegranate" of the land. In the ancient days this fruit was highly appreciated also for its medicinal properties and was mentioned by the well-known

physicians, Galen and Dioscorides. In the thickets of pomegranates still found growing in Spain we have one of the few remaining evidences of Moorish occupation; it was a favorite food in their day. Granada in particular was famous for its fine pomegranates. In the middle ages the fruit was known as *Pomum granatum*, or seeded apple, and this by contraction gives us the present name, pomegranate.

As early as 1521, following the conquering armies of Cortez in Mexico, the Jesuit Fathers brought cuttings of the pomegranate, together with other French and Spanish fruits to this hemisphere, and gradually they were planted in the coast missions of southern California. In some of these old mission gardens, as at San Buena Ventura, pomegranates were found growing with other tropical fruits as late as 1792, and Robinson mentions the occurrence of an orchard of pomegranates at the San Gabriel mission east of the present city of Los Angeles.

This fruit was also early introduced from the Mediterranean countries into the Southern States, but it was not until the middle of the nineteenth century that much attention was paid to its culture in the South. In speaking of the growing of the pomegranate in California, R. W. Hodgson of Berkeley notes that there seems to be no climate that is too hot for it if only water for the roots is obtainable. In Aden, one of the hottest of Arabian cities, where the European hardly dares venture out of his house except at night, this fruit seems to thrive. It is in

the desert regions that the finest specimens are grown, and in fact the climate of the fig and date suits the pomegranate.

The pomegranate grows on a stately tree, often used for ornamental purposes on account of its glossy, green leaves and huge, crimson flowers. The fruit is brownish or reddish-yellow, the size of a large orange, and beneath a leathery rind is found a refreshing red, acid pulp of mild flavor, which surrounds the numerous purplish white seeds. The fruit ripens in September but if not picked will hang on the tree until January without spoiling.

Like the apple and the banana, the pomegranate, if picked after reaching a certain degree of maturity on the tree, will continue to ripen in cold storage, so that it will, under the right conditions, keep and improve in flavor for several months. This fact indicates that the shipment of pomegranates to Northern markets can readily be increased when there is a greater demand for this rather acid fruit.

There has been no very general use of this fruit, as a taste for it has not been developed except among the natives of the tropics. It is used for decorating fruitstands in our markets, and the red pulp and juice are used in salads, punches, and fancy dishes. The fresh, sweet fruit has a crispness and delicacy which is almost unrivaled. The Syrians, after cutting the fruit open, extract the "arils" and stew them with sugar, sprinkle with rosewater, and serve as a rare luxury.

One of the chief uses for the fruit is for making an acid drink; in fact it is used as we use lemons for

lemonade. Scented with rosewater its juice is a favorite beverage in the Levant. In South America the juice is allowed to ferment and produce an alcoholic drink known as *aguardiente*. Since the fruit contains as much sugar as do many varieties of grapes, 12 to 17 per cent., it has been used for wine-making by the natives of many countries, especially Palestine, France, and the Balkan states.

With the increasing use of soft drinks, since alcoholic beverages are no longer permitted, there should be an increased demand for pomegranate beverages. The flavor is agreeable and aromatic; the color of the juice is a beautiful crimson, with no necessity for the addition of a coal-tar dye; the acid, chiefly citric, is seldom above 1 per cent., and 75 per cent. of the weight of the fruit is juice. You would never suspect it, but the pomegranate contains more sugar than the apricot, plum, peach, or orange. A syrup called "grenadine," named from the city of Grenada in Spain, and made from the juice cooked with sugar, is in common use in Europe as a basis for soft drinks. This may be carbonated and served in soda-fountains, or it may be bottled and used like grape-juice.

Pomegranates have been more especially grown in California, Arizona, Georgia, Alabama, Nevada, and Utah. In 1915 one firm in California handled 7219 boxes, netting more than \$6000. If a sufficient market is provided, as has been done for grape-fruit, for instance, the supply can be increased without difficulty to meet the increasing demand, and a valuable addition to our fruit supply will be the result.

TAMARINDS.

In the hot, dry countries every one craves a fruit that will furnish a cooling tart drink, and this demand in the United States is supplied by lemons and lime-juice, but in many tropical countries by the pomegranate, and still further by the tamarind.

The tamarind-tree, which at a distance has somewhat the appearance of the sugar-maple, is a legume, a native of India, and is cultivated in many tropical countries, principally in the East and West Indies; in fact, the name by which the fruit is commonly known signifies, in Arabic, "Indian date." It ripens during July and August. Inside the rather stout pod the beans are surrounded by a dark-colored pasty mass which is the edible part of the fruit. This is used both as a food product and as a medicine, and is official in nearly all pharmacopœias. It is "sour-sweet" in taste, containing about 15 per cent. of organic acids, largely tartaric, with considerable citric acid and quite a percentage of cream of tartar. The tamarind contains also from 31 to 40 per cent. of invert sugar. As one author puts it, "It contains more acid than the sourest fruit and more sugar than the sweetest fruit." It is certainly unique in this particular. The large amount of sugar, however, does not wholly mask the acid, for the fruit still has a distinctly sour taste.

This combination of acids and acid salts makes the tamarind especially valuable as a "mild laxative and refrigerant," as the doctors would put it. In many countries the beverage is prepared by simply

soaking the pulp in water, as the acids and sugar readily go into solution. One can buy the dried beans for immediate consumption, but there are many ways of preserving them for future use. They may be put into jars and covered with boiling syrup, thus making tamarind preserves. A beverage known as "tamarind whey," useful for invalids, is prepared by mixing an ounce of tamarind-pulp with a pint and a half of warm milk. In some countries the fruit is preserved with salt, or the paste is made up into small balls and put upon the market in this form. The roasted tamarind beans have an agreeable flavor and are used as a food in tropical countries.

LEBEN

It often happens that in his wanderings from one oasis to another the nomad of the desert has no fruit and but little water to satisfy his thirst. His food must consist of little else besides meat and dates, figs and the milk of his camels. Milk would not remain sweet for any length of time in these hot climates, thus from time immemorial artificially soured or fermented milk has been a common beverage. It is prepared by adding a little of the previously soured milk to the fresh supply. This was no doubt the beverage that the Arab woman Jael gave to Sisera, as described in the book of Judges, before she slew him with a nail or perhaps with a tent peg driven into his temple. He had asked her for a drink of water, and she, conforming to the custom still prevalent in that country, had given him milk. It is said that to this day, if you pass an Arab

encampment on your desert journey, the half-clad Arab girls will run out of their brown goat-hair tents to offer you a brimming bowl of "leben," their national sour-milk beverage.

KHAT.

It would be strange if the wandering tribes that people the African and Arabian oases did not have some stimulants in addition to the wine made from grapes, dates, figs, and other fruits, the koumiss which is prepared by the fermentation of mare's milk, and the leben, made from fermented camel's milk. Like most races, when left to themselves they have found a stimulant. It is khat, the *Catha edulis* of the botanist. Charles K. Moser, formerly American consul at Aden, Arabia, says, in the "National Geographic Magazine":

When the European is weary he calls for alcohol to revive him; when he is joyful he takes wine, that he may have more joy. In like manner the Chinese woos his "white lady," the poppy flower, the Indian chews bhang, and the West African seeks surcease in kola. Khat is more to the Yemen Arab than any of these to its devotees. It is no narcotic, wooing sleep, but a stimulant, like alcohol. Unlike alcohol, however, it conceals no demon, but a fairy. The khat-eater will tell you that when he follows this fairy it takes him into regions overlooking paradise. He calls the plant the "flower of paradise."

The Arabs have little knowledge as to where the plant came from; they say "it has been always." This plant is cultivated in the mountains in the interior back of Aden. It only grows at an elevation of from four to six thousand feet, away from the salt air and in a soil free from sand—it is very exclusive in its habitat.

Khat is propagated by cuttings, and after growing for two or three years the young twigs and evergreen leaves

are fit to harvest. The plant grows to a height of from five to twelve feet and is cut back each year that it may produce a fresh crop of tender twigs. These twigs are packed in bundles and carried by camels to the market-place, where each bundle is sold at auction to the highest bidder. There are public rooms both for the wealthy and for the poor khat-chewers, where they may smoke and chew at their ease. It had been formerly supposed that the khat was used for a beverage, but it seems never to be used in that way in the Yemen, but always chewed.

Khat contains an active principle that has a lively and immediate effect on the brain and nerve-cells; it makes a gloomy man cheerful, a lazy man active. Nobody works without first having his "ration" of khat. Some day this herb or its active principle may be utilized in other lands to alleviate pain, or as a sedative for tired humanity.

CHAPTER VII

THE MEDITERRANEAN SHORES AND WHAT THEY YIELD

THAT there should be great inland seas, surrounded by fertile lands, in a tropical or sub-tropical climate in both the New and Old World, is an interesting fact, and the location of these seas has much to do with the civilization and distribution of population on both sides of the Atlantic.

In the New World the settlement by civilized races is much more recent than in the Eastern Hemisphere; yet around the Gulf of Mexico and the Caribbean Sea are grouped many thriving countries that furnish rice, sugar, coffee, and an abundant supply of tropical fruits to their northern neighbors.

In the Old World, however, the conditions are different. For thousands of years the population of Asia has been pressing westward along the more accessible routes of travel. The waterways especially attracted them, and naturally some settled by the seaside while others pushed inland. Since the African coast was not so well watered as the northern shore and much of it was a sandy waste, the tide of immigration flowed through Greece, Italy, and Spain, and penetrated into the countries lying to the north until stopped by the inhospitable cold of the Arctic regions.

What a wonderful inland sea is the Mediterra-



SUNRISE ON THE DESERT



Courtesy U. S. Department of Agriculture

SEEDLING DATE-PALM



Courtesy World's Commercial Products

TREADING THE GRAPE IN GREECE



Courtesy N. Musker and Company, Baltimore, Maryland

HAULING THE OLIVE-OIL TO MARKET, ITALY

nean! There is on the globe no other body of water of so limited extent on whose shores so much of human history has been enacted. From the Pillars of Hercules on the west, through Spain, the French Riviera, along the rocky shores of Italy, around through the Adriatic and the Bulgarian states, in the Grecian isles and Archipelago, where the races begin to show a darker skin, in Palestine, Turkey, and Asia Minor, and by the mouths of the Nile, the home of the Moors, and the sand dunes of northern Africa—everywhere history has been made.

Coincident with the rise and fall of these nations has been the development of new and, let us hope, improved dietary habits of the peoples. Besides the well-known foods, which were in common use among the ancestors of these races so long ago that we speak of it tritely as the “days when the world was young,” some new foods have been introduced and all have been much improved by cultivation.

There are a few, and at present only a few, of these food products which are of sufficient interest to us Americans to pay for their importation. There are many, like oranges, lemons, raisins, and some varieties of nuts, which we are able to raise in the United States and so do not need to import in any great quantities. If we look at the invoice of the vessels coming from the Mediterranean to our Atlantic ports of entry, what do we find?

The largest of these, that is, the cargo having the greatest money value, has been the grape products, wine and brandy. These have been coming to our shores until recently (1914) as follows: More than

a million gallons of champagne have been imported, mostly from France; more than five million gallons of still wines in casks have come principally from Italy, Spain, Germany, France and Portugal. By the distillation of wines, brandy is obtained, and of this we have consumed 550,000 proof gallons annually, most of which was sent us from France, with small quantities from Austria-Hungary and Greece. Besides this, Germany and Austria sent us nearly six million gallons of beer and other malt liquors.

With the advancing wave of prohibition, on account of the recent constitutional amendment, it is evident that some other market will have to be sought for these alcoholic beverages, so that it is hardly worth while to discuss them in detail here.

There is one by-product of wine-manufacture that will become of increasing importance in this country, however, since wine is only to a limited extent included in our manufactured products. In the process of making wine a crystalline salt separates out as the amount of alcohol increases during fermentation. This salt when purified is our "cream of tartar" largely used in the manufacture of baking-powder. The crude deposit in the wine vats is known as "argol," and in 1914 we imported 29,793,-000 pounds of it from abroad. California has heretofore had a large production of this salt.

There is already an increasing demand for fresh grapes, and for these we have several sources of supply. California, New York, Ohio, and Michigan will be able to send to market a still larger quantity of grapes; and many wine vineyards will be

replanted with table varieties, or with those suited to the making of raisins, now that the wine industry is threatened with destruction. Already steps have been taken in California to prepare for this change in the use of grapes, as well as to devise uses other than wine-making for the juice of this fruit.

Table grapes, grown in the province of Almekia, Spain, and other overseas localities have found considerable favor in this country. These grapes are picked with great care, packed in ground cork, and shipped in small barrels containing forty-seven pounds of fruit. In normal times Spain has been sending us 1,300,000 cubic feet of grapes; it is customary to compute the quantity for revenue purposes by the space which the grapes occupy rather than by their weight. In 1921 imports of grapes amounted to 751,843 cubic feet.

RAISINS.

Although California furnishes a large supply of raisins, and although we export many more raisins than we import, yet the foreign crop is not to be entirely ignored. Through many years of foreign supply, some people have become accustomed to the imported varieties and naturally prefer them. There is still no doubt a sentiment that "Malaga raisins are very good raisins, but Sumatra raisins are better."

In the Old World most of the raisins are grown in the south of Spain and France, in Greece, Italy, Turkey, and Persia. As classified in foreign countries the raisins include:

1. Muscatels, that is, raisins dried on the vines, including Malaga, Valencia, and Denia Muscatels.

2. Valencia or dipped raisins, including Lexias and Denias from Valencia and Turkey raisins shipped from Smyrna.

3. Sultanas, which include the small seedless raisins exported from Turkey, Greece, and Persia.

Abroad the genuine Muscatels are made from the white grapes grown in the vicinity of Malaga, in the extreme southern part of the Spanish peninsula. The common practice is partly to cut or twist the stem of the ripe grape, to prevent the circulation of the sap and to allow the fruit to hang on the vine in this condition for two or three weeks. This process presupposes a dry climate with virtually no rain and very little dew at night. Raisins cured in this way are of very fine quality.

The second method of preparing, that of drying after cutting, is quicker than that just described, and is better adapted to a climate where no long succession of warm dry days is to be depended upon. The stem of the bunch, when ripe, is twisted or partly cut, the leaves are thinned on the vine to allow the moisture to evaporate from the grapes, and they are allowed to hang in this way for a day or two. Then the bunches are cut off, rinsed with boiling water, which is usually covered with a layer of olive-oil, or dipped into a vat of strong potash lye and salt, sometimes flavored with rosemary and lavender. When the grapes are slightly wrinkled they are withdrawn and spread on wicker trays to dry in the sun for a few days. The oil gives to the raisins a brighter

and more glossy appearance, and they are sterilized by the lye bath. In order to distribute the moisture more evenly the raisins are piled in heaps to "sweat" for a time before they are packed in boxes for shipment.

This latter process of curing, which is common in the vicinity of the port of Denia on the eastern coast of Spain, since it is a quicker process, enables the growers to get their raisins on the market somewhat earlier than the product from the Valencia or Malaga districts.

The Muscatels are packed in layers between sheets of paper in boxes. We are accustomed to seeing the raisins somewhat flattened. This is partly done by pressure of the hand and partly by the pressure in the boxes, which are placed one on top of another before being permanently nailed shut.

Other varieties of foreign raisins are the bloom raisins and the Lexia raisins. The former are made from grapes having a bluish bloom on their surface, and the latter are grown in the Valencia district and prepared by dipping in hot lye. Valencia is a province on the Mediterranean coast of Spain, about as far north as the port of Lisbon in Portugal.

Asiatic Turkey formerly sent a large quantity of raisins to this country. In 1914 we imported more than 2,700,000 pounds from that region and only about 1,700,000 pounds from Spain. Most of the Turkish raisins are shipped from the port of Smyrna. These include the red Chesme, and Eleme, a hand picked variety, of good size and sweet, pleasant flavor. The best Italian raisins are produced in

the province of Calabria, in the extreme south, and some are shipped from the neighboring island of Sicily.

The total quantity of raisins imported from all sources in 1921 was 16,879,933 pounds.

The Sultanas are made from a seedless variety of grapes grown in the immediate vicinity of Smyrna. The vines, after they become productive, can be depended on to bear a crop for fifty years. There seems to be something peculiar about the climate and especially the soil of this region so that it is peculiarly adapted to the growth of this grape. The vines are planted on the sloping hillsides to a height of 400 feet above the sea. It is said that attempts to raise Sultana raisins in other regions have resulted only in obtaining a grape which reverts to the seeded type. The Sultana raisins are familiar to us as the golden-yellow, thin-skinned, translucent, seedless variety so popular in the kitchen.

Loose Muscatels seeded by machinery from California are becoming the most common form of raisins for culinary use. These and the Sultanas in boxes and in cartons are shipped all over the world in increasing quantities.

On account of the rainless summer in California, especially in the vicinity of Fresno, this State has become an important competitor of the Mediterranean countries for the raisin trade. The industry was started in 1870, but in 1894 the crop was abundant enough virtually to supply the United States. California has frequently also had the advantage of a protective tariff and by intensive advertising has

greatly increased the demand for raisins. Especially in times of sugar scarcity has the raisin increased in favor, for we somehow have learned that a food containing 74 per cent. of sugar must be highly valuable in the production of energy.

There is one other raisin, the Zante currant, that so far has always been imported from the Mediterranean regions. By a curious corruption of the name "Corinth," for in that country they were called "Corinth grapes," the English speaking people called them "currants." They are grown on the Ionian Islands, southeast of Greece, principally on the islands of Zante, Cephalonia and Ithaki, and any attempts to grow them elsewhere, even in other parts of Greece, have resulted in producing a different kind of grape.

In writing of Zante, Charles Dudley Warner says: "Sharp hills rise behind the town, and, beyond, a most fertile valley broadens out to the sea. Almost all the land is given up to the cultivation of the currant-vine and the grapes of Corinth, for in the transfer of the chief cultivation of this profitable fruit from Corinth to Zante the name went with the dwarf vines. On the hillsides, as we sailed away, we observed innumerable terraces, flat and hard like threshing-floors, and learned that they were the drying-grounds of the ripe currants."

In 1914, 32,000,000 pounds of "currants," the equivalent of 50,000 tons of fresh grapes, were imported into this country, chiefly from the port of Patres, where most of this fruit is collected for export. The 1921 figures show 57,036,538 pounds. The

grapes are gathered in August, when overripe and nearly black, and are dried in the sun, picked from the stems, packed in barrels weighing about three hundred pounds, and shipped to other countries. Here the importers clean and repack them in boxes or cartons for retail distribution.

Experiments recently made in California indicate that Zante currants can be profitably raised there.

OLIVES.

Considerable has already been said in Chapter IV on the cultivation of the olive and the production of its oil. Although California is each year growing a larger crop of olives we still depend on foreign countries for a considerable supply. From Spain, Italy, Greece, and Turkey in Asia have come most of our pickled olives. We imported more than 5,000,000 gallons in 1914 and 4,778,000 gallons in 1920.

A few years ago only green olives were pickled and put on the market, but more recently the processes of pickling ripe olives have been so much improved and the taste for the ripe fruit has so largely increased that the market for green olives has proportionately decreased. To make olive pickles from the green olive, the fruit is carefully picked by hand about six weeks before it becomes ripe and is placed in a 2 per cent. solution of lye to remove the bitter taste. It is then soaked and washed with water and leached in several brines of increasing strength, and finally packed for shipment in brine sterilized and recently boiled. To insure a good product, the olives

should remain in the pickle three months before being used.

In preparing ripe olives, which are, when fresh, of a purplish color, they are soaked several times in water, then in a strong sterilized brine, and finally in a weaker brine. Although both green and ripe olives have a high food value, we generally regard the ripe fruit more as a food and the green olive as a condiment. In the markets of Greece, Italy, and other Mediterranean countries, dried ripe olives are exposed for sale, but to the foreigner at least they have a disagreeable, astringent taste.

The United States Department of Agriculture has recently investigated the fatal cases of poisoning that have arisen from eating olives, especially ripe olives and those which were stuffed with pimento. This poisoning was found to be due to the presence of the bacillus botulinus. Canned string-beans, asparagus, cheese, sausage, and the like may also contain this same bacterium where the food has not been thoroughly sterilized by heat. It has been found both in commercially packed food and in that canned in the home. The chances of getting poisoned by using these canned foods seem very slight when we consider the millions of cans of vegetables that are used each year and the very few cases of poisoning that have occurred. The consumer should remember that it is only *spoiled* food that contains this bacillus, and if the contents of the can have an offensive odor, if they have an abnormal appearance, or if the can is a "swell" or gives off gas, the food

should be discarded. By no means all canned food that is *spoiled* contains the bacillus botulinus, but it is likely to contain it and therefore should be regarded with suspicion. Thorough cooking destroys the bacillus so that food that is taken from the cans and served without cooking, as in salads and the like, is much more apt to produce serious results. Canners are now taking special precautions thoroughly to sterilize their "pack," as they are as desirous as the public to have their products safe and sanitary.

CITRONS.

No picture of the Mediterranean shore is complete unless it includes the "vine-clad hills and citron-groves of Ceresole"; no catalogue of the imported citrus products is complete unless it includes that delicious confection, candied citron.

Citron-groves have been cultivated from the earliest times along the Mediterranean coasts. That citron is a fruit of great antiquity is shown when we read that the Hebrews carried branches of palm and citron-trees to the tabernacle on their great feast-days, and we know that the wild citron was a common tree in Asia Minor. Some have even suggested that all our citrus fruits—the orange, lemon, grape-fruit, and so on—had a common origin in the wild citron-tree.

The fruit suggests the lemon in its appearance and manner of growth, but it is larger and usually weighs three pounds or more. It has a thicker skin and a smaller proportion of pulp than the lemon. Sometimes the juice is exported, but the chief commercial

product is the preserved or candied rind. The oil in the skin has such a pronounced flavor that in preparing the confection it must be extracted from the fruit by soaking for several weeks in brine. The fruit is then boiled to extract the salt and to loosen the pulp, which is readily scooped out.

The citron may be candied by boiling it with sugar, but it is more recently contended that a softer, better-flavored, and more translucent product is obtained by using some commercial glucose with the cane-sugar in preserving. The fruit is boiled for an hour, allowed to stand for a week, then again boiled until it has absorbed as much sugar as it will take up, and again allowed to stand. In the finishing process the rind is boiled in pure cane-sugar syrup, so that some of the sugar may crystallize on the surface. The product is much in demand for confectionery and in making mincemeat, cake, and the like.

The citron is chiefly cultivated in France, Italy, Corsica, and Sicily. There are special varieties grown in each district, as, for instance, the common citron grown in and about Genoa, the Florence citron which grows in Tuscany and has a delicious aroma, the large citron grown in Liguria, which is very irregular in shape and seedless, and the sweet citron, a hybrid, between the citron and the orange.

Although at the present time some citrons are grown and some rind is preserved in California and in Florida the bulk of the commercial product still comes from Mediterranean shores.

CITRUS BY-PRODUCTS

Southern Italy is so well adapted to the raising of lemons that for years we have depended upon that country for our main supply, but with changed conditions in the United States the quantity imported has gradually decreased. In 1914 we imported lemons to the amount of \$5,981,635, mostly from Sicily; as transportation conditions had become more difficult, the value of the lemon cargo was only about \$2,000,000 in 1918 and in 1921 \$1,230,000.

Although we can depend on California and Florida to furnish us with large quantities of lemons at a reasonable price, there are still two or three citrus by-products that are imported. A small quantity of lemon-oil is made from culls and frozen lemons in California by mechanical processes, but the bulk of the oil that we use comes from Sicily and Italy. Four to five hundred thousand pounds come to us annually from this source.

Most of this oil is made by a rather crude process known as the "sponge" method. After removing the pulp from the lemons the halves are soaked with water. Each piece is inserted by the workman into a cup-shaped sponge held over a bowl, and then, by pressure of the hand, using a stick of wood as a rest, the oil is squeezed out. The rind is turned several times so as to press it completely. Two or three pounds of oil a day is obtained in this way. There is also used a crude hand-press by which the oil is pressed from the rinds.

From lemon-oil the lemon-extract of commerce is

made, by dissolving five parts of the oil in ninety-five parts of strong alcohol. On account of the cost of alcohol a great variety of adulterated extracts of lemon have been on the market until within a few years. Many of these contained only traces of oil of lemon and were colored yellow with aniline dye in imitation of the genuine extract.

Notwithstanding the fact that the citrus by-product factories of California and elsewhere are utilizing thousands of tons of waste lemons in the manufacture of calcium citrate and citric acid we are still importing a considerable quantity of these materials: 3,000,000 pounds of calcium citrate in 1914; 12,490,000 in 1920, but only 989,000 in 1921.

To make calcium citrate the pulp is pressed and the juice thus extracted is clarified and filtered, then nearly neutralized with boiling-hot calcium carbonate; the calcium citrate thus produced is separated from the liquid by putting it through a filter-press. The insoluble salt is either treated directly with pure sulphuric acid, forming insoluble calcium sulphate, which is filtered off from the liquid citric acid, or it is shipped to one of the large Eastern cities for the completion of the process. Other by-products are concentrated lime-juice, candied peel, and salted lemons and marmalades.

MUSHROOMS

“Beefsteak and mushrooms” is a favorite order with the epicure; beefsteak for food, mushrooms for flavor. Notwithstanding many lurid articles that were written a few years ago in which it was stated

that there was as much nutriment in a pound of mushrooms as in a pound of beef, and that hundreds of tons of this valuable "foodstuff" were from ignorance, allowed to go to waste in our fields and forests, the world has at last got back to the plain fact that mushrooms and truffles are only useful for flavor and not for food.

While we do have an abundance of home-grown mushrooms, and they are actually "just as good" as the foreign-grown, we have not, as a people, enough information properly to utilize them, and we do not care to explore in unknown paths that may lead to the cemetery. Accordingly we import mushrooms in various forms, as dried, canned, powdered, bottled in oil or butter, and preserved in other ways. In the year 1914 there was imported 9,188,177 pounds of mushrooms and truffles, more than 90 per cent. coming from France, with small quantities from Japan, Russia, and Italy. Imports for 1921 were 4,953,548 pounds.

Mushrooms and truffles have been used as food since the time of Pliny. They have been in much more demand in Europe and by the common people of China and Japan than in the Western world. By ignorant people the poisonous varieties are called "toadstools" and edible ones "mushrooms," but no such classification is recognized. Mushrooms are not at all like ordinary plants, for they really have no roots, stems, or leaves. In the common varieties they are propagated by the little cells called "spores" which are produced between the gills on the under

side of the cap. Each spore, if it finds the right kind of a place for germination, will produce a thread-like growth. These are known as "spawn," and it is this that is sown in mushroom beds. On these, little thick nodules are formed, and from the nodules, with sufficient moisture, the mushrooms mature so quickly that we have coined the expression, "a mushroom growth," for whatever grows rapidly.

It is to France, England, and Italy we should go if we wish to see mushroom culture on a commercial scale. About Paris, mushrooms have been cultivated since the sixteenth century. Caves, abandoned quarries, and even the catacombs in the vicinity of the city have been utilized for mushroom gardens. The fungus grows readily in these "spooky" places, not so much because the daylight is shut out as because, being virtually underground, the temperature is even and the humidity of the air can be carefully regulated. Some of the mushroom-beds are from sixty to eighty feet beneath the surface, and in one cave it is stated that there are twenty-three miles of beds, which produce for the markets of Paris thousands of pounds of the delicious fungi daily.

Mushrooms are grown on very rich soil, consisting largely of well-composted horse-manure, and they are daily watered to increase the crop. After a few years the fertilizing material becomes exhausted and is taken to the surface for use in vegetable gardens. A new manure bed is then prepared. The "buttons," as they are called, are gathered before they are fully matured, and when we get them

from the importer they are really not as good as the fresh mushrooms that might be gathered in our pastures at home.

Among the edible mushrooms growing in the United States, and there is a great variety, one of the most common is the *Agaricus campestris*, which grows in open pastures. Another is the *Marasmius oreades* Bolt, or fairy-ring champignon, which is smaller than the above and is usually found growing in a circle. The "morel" is a variety imported in a dried condition especially from Germany and is in common use for flavoring sauces.

Since there are mushrooms that are poisonous, the only safe way is to purchase those that have been cultivated and are known to be edible, unless one is an expert. The numerous "rules" and "tests" published for the guidance of the uninitiated in the selection of wild mushrooms are likely to mislead him and cause serious results.

Poisonous mushrooms contain various alkaloids and other harmful principles which produce very serious symptoms and sometimes death. The symptoms do not always appear immediately after eating the poisonous fungi but may be delayed even for twenty-four hours.

Again it is from the French people we learn the valuable flavoring qualities of another of the fungi, namely, truffles. These are found growing beneath the surface of the leaf-mold in France, England, and Italy. Some of the best varieties come from Perigord, in the southwest part of France, and from the department of Vaucluse, in the lower Rhone Valley,

They grow particularly well in the shade of the trees in the oak forests. Those who make a specialty of gathering truffles are called *caveurs de truffes*, and they pick them every day or two and take them to the nearest market towns, where they are sold to the commission merchants. The *caveur* realizes from forty-four cents to \$1.30 a pound for his produce.

As truffles, especially the most prized varieties, have a strong aromatic odor, it has been found possible to train pigs and sometimes dogs to hunt them in the woods. When the quarry has been pointed, the animal is rewarded with a piece of cheese or some such delicacy. Truffles are of several varieties, both black and white, and the best specimens are no larger than an English walnut, although specimens weighing a pound are not uncommon.

The first-of-the-season truffles, which are gathered in August, are black outside and white inside, and have little fragrance, but as the weather becomes colder they improve in quality and fragrance. The season lasts until the end of March.

The delicate aroma and flavor of the truffle makes it highly prized, but as they are difficult to obtain they of course command a high price. As some one has remarked, "Perhaps if they were not expensive but were within the reach of everybody, we should not prize them so highly." France in 1913 exported 451,500 pounds of fresh, dried, and pickled truffles.

The question is frequently asked: Why can we not find truffles in the United States? Dr. B. M. Duggar of the United States Bureau of Plant Industry says that there are some small species, similar

to one of the well-known Italian species, occurring on the Pacific coast and that one form has been discovered in Minnesota and in New York. Climatic conditions for growing truffles seem to be favorable especially in some of the Southern States.

ONIONS

If there is anything that we think can be raised almost anywhere in this country, in the North or in the South, it is onions and other plants of the *Allium* family. Yet it has been our custom to import more than a million bushels every year. Of these, 630,000 bushels came from Spain in 1914, with smaller quantities from England, Bermuda, Australia, Italy, the Canary Islands, and some other countries. In 1921 a total of nearly 2,000,000 bushels arrived.

Probably the chief reason why so many onions are imported is because, curiously enough, those grown in warm countries have a mild flavor and possess less of the acrid principle than those raised in colder latitudes. If tested by being eaten raw, boiled, or fried, the Spanish onions will be found most mild and agreeable. In the process of boiling or frying it is evident that much of the acrid volatile oil, to which the flavor is largely due, is dissipated, for we do not need to be told when onions are to be served for dinner. This volatile oil has been analyzed by the chemist and is known as allyl sulphid, producing an effect upon the eyes similar to the tear gas that was recently used in the Great War. That sulphur is present in onions as well as in mustard and horse-

radish is a well-known fact, and is shown by the action of these vegetables on silver, as it produces a black coating of silver sulphid.

Garlic is one of the most strongly-flavored of the plants of the *Allium* family, and the odor even sticks to the breath and the perspiration of those who persist in eating it. Although garlic could no doubt be grown readily in the United States, immigrants seem to think that the "home-grown" product is better, and we import every year about eight million pounds for their use. Imports for 1921 were 7,030,824 pounds.

Other plants of this genus, such as leeks, shallot, and chives, are in much more common use in foreign countries than in the United States.

SNAILS

There is nothing in the soil, climate, or other conditions, especially in the South, that would prevent our raising in this country all the snails that the people demand. We simply have not the professional growers who take the trouble to supply the market, and accordingly we import about \$50,000 worth of snails, fresh and canned, every year. The edible snails are of course entirely different from the shell-less mollusks often called slugs in the United States.

There is really no reason why these mollusks, grown abroad in clean surroundings, living on lettuce or aromatic herbs, should not become a part of our food, as well as oysters, clams, and mussels. They are popular in many European countries and espe-

cially in Paris. The dealers in the Halles Centrales, the great food market of Paris, sell no less than eighty million snails annually.

Such is the demand for snails that "snail-nurseries" have been established in France, Austria, and Germany. Under the protection of bushes or wooden shelters, and in the vicinity of an abundance of water, these mollusks are raised for the market. In Vienna the snail market is especially well patronized during Lent, the snails being largely shipped in from Württemberg. Half a dozen different varieties of snails are cultivated and, just as we have a special season for oysters, there are special times, one in spring and the other in the winter, when snails are in the market. Although snails are soft and easily digested when raw, they become somewhat tough upon cooking. A common method of preparation for the table is with spices, herbs, or wines.



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OLIVE-OIL PRESS



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FIELD OF GINGER



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SORTING CINNAMON

CHAPTER VIII

RICE AND SPICE FROM THE FAR EAST

LET us browse around among the boxes, bundles, and bags of the aromatic cargoes that the ocean liners and tramp steamers are bringing to the wharves of our Atlantic, Pacific, and Gulf ports. There was a time when these products from foreign shores were landed on particular wharves, and we went to such localities as India Wharf in Boston to smell the rich and spicy odors of the East. Now, with the changed conditions of transportation, it is difficult to tell under what flag, or at which dock of the great overseas trading companies, these goods may be landed. Are these products the luxuries or the necessities of life? Here is perhaps a cargo of rice. We are inclined to ask: Why is rice imported? Do we not grow it anywhere along our South Atlantic and Gulf coasts? Yes, but we have never until recently raised half enough to supply our home market.

Rice is a native of India and southern China, but it is impossible to name definitely the date when it was first used in these countries. Some varieties of rice were undoubtedly found by the aborigines of many tropical countries growing luxuriantly, especially in low, wet places near their seacoasts. As the population increased, the need of having more food than that obtainable from the wild varieties led, in

very early times, to its intensive cultivation. Referring to the almost prehistoric cultivation of rice, it is said that a ceremonial ordinance was established in China by the Emperor Chin-Nung, 2800 years before Christ. On this occasion the emperor himself sowed one variety of rice, and seeds of four other kinds were sown by the princes of his family.

Although no mention of rice is made in the Bible, it seems to be proved that it was not an uncommon crop in the broad valley of the Euphrates at least four hundred years before the time of Christ. From the remote East the cultivation of rice spread through the rich tropical countries and into the islands of the sea, both east and west. The flowery kingdom of Japan was found to be especially adapted to its growth, and very early rice became the staple cereal of that country, even as wheat has been utilized in Europe and America.

Rice appears to be almost an essential part of the diet of those peoples who live in the torrid zone and in parts of somewhat cooler climates near the coast where heavy rains are prevalent, as along the Gulf coast of the United States. The other cereals cannot readily be raised in these regions, and, if shipped in, they often mold and heat. Rice is by nature well protected from moisture by its dry, horny husk, which keeps the dampness from getting into the softer inside portion of the grain.

In the Philippines, as early as we know anything about these islands, the cultivation of rice has been one of the chief occupations of the people. In fact it was virtually the only cultivated crop found grow-

ing there when the islands were discovered by the Spanish explorer Magellan in 1521. For three centuries after the Spanish took possession of the islands, rice was the principal crop, and it was grown in increasing quantities until 1885. Then production began to fall off, and instead of exporting rice to surrounding countries the islanders were actually obliged to import the grain for domestic consumption. One cause leading to this diminished production was that the growing of hemp, sugar, and other crops was found to be more profitable.

As we have in our prairie States both dry summers and wet springs, which insure the growth and the final ripening of the wheat, so in the rice-growing regions they have an abundance of warm summer rains which are needed for this particular crop. Southeastern Asia and the adjacent islands are especially adapted to the growing of rice because the monsoon, a sea-breeze, laden with moisture from the Indian and Pacific oceans, blows across these lands throughout the summer. First comes the hot moist season when the crops grow luxuriantly and the people must work hard in their fields to prepare the food which they will need in the season of drought that follows.

With rice as the leading cereal these regions have become more and more crowded until we actually find more than one-half of the human race settled in this corner of the earth. With semi-civilized people density of population is largely a matter of climate and food-supply. Rice for them takes the place of the potatoes, the wheat, the rye, or the millet grown

by their northern neighbors. The lands bordering on the Mediterranean, where rice was introduced in 1468, were also found to produce this cereal abundantly, some of them in great excess of the amount demanded for home consumption. Spain, for instance, is able to export more than 100,000,000 pounds of rice annually.

If you ask how rice came to be introduced from the Orient into this new Western land it is related that in 1694 an English boat, homeward bound from Madagascar, was forced by bad weather to put in at Charleston, South Carolina. The captain paid a visit to Governor Smith, whom he had previously met in Madagascar, and gave him a small bag of rice from the store on board his vessel. The governor planted the seed in a swampy part of his garden, and from this beginning sprang the rice industry of the Carolinas. Ever since that time it has been an important part of the simple diet of the negroes of the South, although it has never been quite so essential as their "hog and hominy." Their former dependence on these staple foods is well illustrated in the old war-time plantation melody:

De yam will grow,
De cotton blow,
We'll hab de rice and corn.

In our own country the cultivation of rice was common in South Carolina and Georgia before the Civil War, and in earlier times the Southern States grew most of the rice for domestic commerce. More recently Louisiana, Texas, and Arkansas have furnished most of the product raised in this country.

The rich prairie lands of southwestern Louisiana and southeastern Texas are specially adapted to raising this cereal, and in fact in these States rice-culture has largely taken the place of sugar-growing. These rich alluvial lands are nearly level and have a clay sub-soil which keeps the water from soaking away too rapidly. Dykes and dams have been built to enable the farmer to irrigate the land when he pleases, and numerous pumping-plants keep the ditches filled. The ground when dry is cultivated like a wheat-field, and after the crop has ripened the water is drawn off and the crop can be harvested by the use of modern harvesting machinery.

J. Russell Smith says that in Louisiana it has been found the rice-plant requires about one-half an inch of water a day for ninety days, so that the rainfall of twenty inches during the rice season must be supplemented by twenty-five inches of water furnished by irrigation. Not less than 10,000,000 acres of land on our Gulf coast are suited to the growing of this cereal. It is probable that more rice than can be consumed might easily be raised in the Southern sections of the United States. The delta of the Sacramento River in California is a new and very promising area suitable for its cultivation. There production has increased rapidly since the rice-farming experiment was started, so that in 1919 nearly 8,000,000 bushels were raised.

In some Eastern countries the grain is sown on the water, which is afterwards drawn off to allow cultivation. While the rice is growing it is flooded several times, and for the last time about eight days be-

fore the harvest. If sown in drills rice can be readily cultivated between the rows, and this method is now considered preferable to the older one of broadcast-ing.

As early as 1713 the British colonists in America began to export rice, and in 1836 the amount shipped abroad was 127,000,000 pounds. There was then a rapid decrease during the next fifty years, but more recently increasing quantities have been exported, and this in the face of the fact that not nearly enough has been produced for domestic use.

No doubt rice will always be imported, even if we eventually raise as much as we consume, for our Chinese, Japanese, and Italians naturally prefer the varieties grown in their own countries, and they are also partial to the native methods of milling and preparing for market. The South Carolina and Japanese rices are comparatively rich in fats. Some who have learned to appreciate a fine flavor in their food always select the varieties found to be the most agreeable.

The higher wages paid in the United States need not necessarily limit the growing of rice in this country, for here a much larger area can be cultivated by a single farmer. It has been shown that while in Japan, China, India, Siam, and the Far East farm wages are very low, one man can raise only from half an acre to three acres of rice; on the other hand, in southwest Louisiana and Texas, although wages are often ten times as much as in the Orient, one man, by modern methods of farming, can cultivate eighty

acres of the grain. There are scores of different varieties of rice grown in different parts of the world, some being adapted to one climate and some to entirely different conditions of soil and temperature.

Although some rice is raised on the uplands, most of the grain is grown in damp soil where there is a sub-soil that holds the moisture, and in localities that can be readily flooded. In the interior regions of India, China, and Japan an upland rice is raised with considerable success where the soil is sufficiently rich, but a bountiful crop is not always so well assured as when grown on irrigated land.

In some foreign countries the grain is cut with a reaping-machine, but very often, especially in India, China, and Japan, that primitive instrument, the sickle, is still used, just as it was hundreds of years ago. In foreign countries usually the threshing is done by hand, with the aid of some simple device such as a board with a slit in it. By drawing the stalks through the slit the kernels are pulled from the heads and fall into a receptacle underneath.

One advantage that rice possesses over other grains is the ease with which it can be prepared for use. As the grain is covered by a husk, this must be removed, and both in this country and abroad the primitive process of pounding it by means of a mortar and pestle is in use. A mortar is hollowed out of a block of hard wood by burning or cutting, and a wooden pestle is turned or trimmed down so that it will approximately fit the mortar. The pestle, which

weighs ten or fifteen pounds, is raised and dropped into the mortar until the hulls are loosened; then these are blown out by the wind in a simple process of "winnowing."

In the Orient, as unhulled rice keeps better, the "paddy," that is, the grain in the husk, is not hulled until it is needed for domestic use. Throughout the East, the most common domestic noise heard about the huts of the natives in the early morning is the dull pounding of the pestle as it falls into the vessel of paddy loosening the husk from the day's supply of cereal. By a natural extension of the above process, a mill was so constructed that a number of these pestles could be dropped into corresponding mortars by the use of drums driven by water or steam-power. Later, millstones were used to separate the hulls from the kernels, and screen-blowers to separate the chaff. The product of this process is called unpolished or rough rice.

Rice as thus prepared is fit to use for food, but in order to give it a finer appearance and make it more attractive to the eye a method has been devised for rubbing off the outer layer by means of leather rollers in a polishing-machine. It has been repeatedly shown that this polishing process removes from the rice much of its most valuable nutritive material, especially that part containing the major portion of the fat and most of the vitamins. In addition, the flavor is injured. Various malnutritional diseases such as beri-beri have become prevalent where the people depend almost wholly upon polished rice for their food. It is stated that a man supposed to be

dying of beri-beri in Japan was fed a dish of rice bran gruel, and to the surprise of everybody in four days he was able to go home completely restored. It is believed that the vitamins, while not of nutritive value in themselves, enable us to utilize the food material in the foods that we eat. Notwithstanding all this direct testimony, the housewife still demands a polished white rice.

No one attempts to make bread from rice alone, as it lacks the gluten which is found in wheat and some other grains and which when mixed with water makes a sticky dough that entraps the air and carbon dioxide, thus forming a light product. The Orientals usually boil their rice and flavor it with meat or fish or perhaps add curry or a hot seasoning preparation. Unpolished rice is the variety usually eaten by the common people of the East.

Rice is shipped to this country, hulled but often unpolished, usually in bags or barrels holding 162 pounds. From 162 pounds of rough rice the mills secure ninety-five pounds of clean rice, eight pounds of polish, thirty pounds of bran, and twenty-nine pounds of waste. In India, Siam, and other Asiatic countries, grain is carried down the rivers in native boats and finds its way to the great ports of export. Here the paddy is cleaned and often polished and coated for the Caucasian markets. From our own ports of entry, New York, Boston, Philadelphia, New Orleans, Galveston, and San Francisco, rice is distributed over the country.

Why is rice such an important cereal in so many countries of the world? One reason is its yield to the

acre. Do you know that in 1917, while our average acreage production of wheat was 14.2 bushels, and of corn 26.4 bushels, the average of rice was 37.6 bushels?

Since rice forms the principal food of more than 700,000,000 people in China, India, and Japan, its nutritive value should be considered. Is it good, wholesome food? Yes, but not to the exclusion of other foods, because it is poor in proteins and fats, both of which are as essential to growth and energy as the carbo-hydrates. Where teeming thousands must be fed on the product of a small area, it is out of the question to try to grow sufficient meat to supplement the cereals. In these moist warm climates the legumes grow luxuriantly, so that with a cheap cereal like rice, and abundant peas, lentils, beans, and soy-beans, and small quantities of meat, fish, or eggs, the balanced ration is maintained. Some of these legumes, as the soy-bean, also contain an abundance of the fat that is essential to the nutrition of the animal body. In this country it is common to supplement rice with meat, fish, game, eggs, and milk products.

The process of cooking rice by steaming, such as is used in Japan, is perhaps the best, as in it each grain is allowed to swell, and the product consists of the whole grains thoroughly cooked. In whatever way prepared, the water used in cooking should not be thrown away, as it contains much of the nutritive material that ought to be retained. Rice absorbs nearly five times its weight of water when cooked, is easily digested, and is always regarded as

an excellent food for convalescents because it is so completely absorbed in the intestines.

Some of the interesting Japanese rice dishes are thus described by Dr. Mary E. Green: "*Shir-a-ta-ma* is made from the glutinous varieties, which are first steeped in water, then ground and washed through fine sieves. The residue obtained is dried over a coal fire, then made into small round balls of dough, which, when steamed, are eaten with soups and with sweets. *Ame*, prepared from malt and from flour of glutinous rice, greatly resembles glucose. It is a delicious sweetmeat. Its making dates from 100 B.C., when sugar was unknown. *Do-mo-ji* is rice steamed, dried, and then ground into flour. It may be prepared for use whenever wanted, and is eaten with sugar. It is especially valuable to travelers and to an army on long marches. *Kori-mochi* is made from steamed rice beaten into a paste and then frozen. Water is poured upon it to soften it, and it is served with sugar."

For the year ending June 30, 1914, just before the war, we imported into this country 290,194,917 pounds of rice and rice products. Of this more than 30,000,000 pounds came from China, 53,000,000 pounds from Japan, and large quantities were brought in from the Netherlands and Germany by reshipment. During the same year, we exported 22,000,000 pounds, the larger portion of which went to Cuba and Central American states. We produced in 1914 656,917,000 pounds. There was a crop of 41,000,000 bushels of rice in the United States in 1921, while we imported 174,000,000 bushels. We

get some of our supply from India and Siam. There is no doubt that the rice-growing area of the globe can be greatly increased, for there is land that might be utilized for this purpose in many of the Latin American states, as well as in Borneo, Papua, Sumatra, and northern Australia.

The story of the use of rice in the United States is rather remarkable. Before the last quarter of a century, rice was regarded by many people as a purely Southern dish, because there it was in daily use as a vegetable, but in the North only incidentally as a dessert. More recently, as the nutritive value of rice has dawned on the people all over the country, its use has more than doubled.

SPICE

The bags of rice are only a part of the cargo of the vessels that come here from the East Indies and the far-away islands on the other side of the world. The spicy odors in the hold and warehouse have already delighted us as the salty breezes have borne them to our nostrils. Let us talk about flavor, for spices are flavor and of no nutritive value. They are not, however, for that reason to be neglected in the preparation of food, for they "bring up" the flavor of otherwise tasteless foods as pumpkin-pies or rice-pudding or insipid fruits. They act as preservatives if added in sufficient quantities and often supplement, in an agreeable way, the flavors which we already enjoy, as when we add vanilla to chocolate, thereby making a delicious combination of flavors.

In many cases the taste of the food is injured by the use of spices. If there is a naturally agreeable flavor of the fruit or vegetable, it might much better be retained than modified or disguised by spices or condiments. Says Henry T. Finck: "Excessive use of spices is the chief blemish of German cookery. Many otherwise well-made dishes are spoiled by the addition of pungent condiments which completely monopolize the palate. The excessive use of their condiments is a survival of medieval coarseness."

Aside from the every-day preservatives and condiments, such as salt, sugar, and vinegar, and the flavor derived from wood-smoke and from home-grown garden herbs and seeds, we have for scores of years depended on the Far East for spices.

The "spicy breezes that blow soft o'er Ceylon's isle" bring to us impressions of cloves and cinnamon, ginger and nutmeg, pepper and allspice—all Asiatic products. The substantial old sailing-vessels that traded in the Asiatic ports always included in their cargo bales and bundles and barrels of sweet-smelling spices. This cargo was unloaded at the dock of the European or American port, and the aromatic East India goods were sorted and cleaned and distributed from the wholesale houses, to appear finally as an appetizing flavor in the kitchens of the poor as well as the rich. Nowadays these products are transported much more rapidly across the seas, but they are still in demand among all classes of people.

What are these flavors that we so much desire? The chemist will tell you that they are usually some

essential oil or some volatile principle, some mixture of ethers or esters, curiously and wonderfully manufactured in nature's laboratory, and which we have found to be agreeable to the palate. We can make a lot of them artificially in the laboratory, now that we have found out what they really are. At present it is often cheaper to go back to the original plant-laboratory for our product, for there strikes and "high overhead" do not restrict the ability to turn out the product with each returning season. These aromatic substances are volatile when the material is boiled with water, and many of the active principles may be obtained in a state of purity by simply separating them from the condensed steam. That is the way that oil of cloves, oil of sassafras, or cinnamon-oil is made. But this agreeable odor is given off continually below the temperature of boiling water and that is why the wharves, the docks, and warehouses of some sections of our seaport towns—these busy hum-drum commercial places—are filled with what Milton has called "Sabeian odors from the spicy shore of Araby the blest."

The commercial value of spices diminishes a little month by month. We talk of "old wood to burn, old wine to drink, old friends to trust"—but never of "old spices to use," because spices are better when fresh. All parts of the plant may yield these aromatic substances; we get them from leaves, buds, flowers, bark, roots, seeds, and immature and ripe fruits. Sometimes the plant has hoarded these precious flavors in one place and sometimes in another,

and we have learned to utilize that special part where the principle is found in greatest abundance.

CINNAMON

The tropical island of Ceylon, on the southeast coast of India, has always been noted as the original home of the cinnamon. This state, with an area five-sixths as large as that of Ireland, with its low-lying northern coast and with interior mountains towering to the height of more than a mile, is admirably adapted to the growth of the sweet cinnamon.

Into the harbor of Colombo, on the west coast, come the ships of the world to take on their cargo of cinnamon-bark, tea, cocoa, cocoanuts, India-rubber, pearls, and precious stones. This beautiful city of more than 150,000 inhabitants is the metropolis of the island and has a long history of siege and capture, for its forts command the harbor which gives access to the rich products of the mountain jungles and plains of the interior.

For centuries Arabs and other traders kept the secret of the source of cinnamon from the outside world. It is remarkable that this most jealously guarded secret should have remained so long undiscovered. The ancients were not wanting in the knowledge of the value of cinnamon, for it is frequently referred to in the Bible and also by the classical writers, Galen, Pliny, and Dioscorides. The Greeks and Romans prized it so highly that they thought it a fit offering for their gods. We read that

with garlands and chaplets of cinnamon Vespasian dedicated the temple of the Capitol. Monsieur Apoloro, a recent writer, says that the Arabs told many strange and weird stories in regard to the place where cinnamon was found, in order to keep the too inquisitive trader away, so that they might retain their monopoly. Herodotus evidently believed these tales, for he tells in all seriousness that cinnamon-bark is found only in those far-away countries where "winged serpents" abound and that these creatures build their nests of cinnamon-bark. The Arabs, it was said, in order to obtain the coveted treasure, placed large bones on the ground in the vicinity, and the serpents took these to their nests, but on account of the weight of the bones the nests were broken down. The Arabs then came from their places of concealment and carried off the bark from the ruined nests. Pliny, commenting on this statement, says, "Lies all, both the one and the other, for cinnamon grows in Ethiopia, a country near the Troglodytes."

Just as we read of earlier religious wars, and raids for the purpose of carrying off the gold supposed to be abundant in some far-off countries, so, on account of its wonderful yield of cinnamon, Ceylon was the scene of many wars during the seventeenth and eighteenth centuries. After being ruled in turn by the Malahais and the Singhalese, the island of Ceylon was finally captured by the Portuguese. Their cruel greed and extortionate treatment of the natives in order to obtain the cinnamon-bark, which the latter had gathered in the jungle, at

last aroused the natives to appeal to the Dutch, with whom they were on friendly terms, to relieve them. The Dutch laid siege to Colombo, and for seven months their fierce warfare was carried on. Thousands perished by the sword or through starvation.

When at last the Dutch had conquered the island, their treatment of the natives was hardly less cruel than that of the former rulers, and they tried both by fair and foul means to obtain a monopoly of the cinnamon trade of the world. Not a single cinnamon plant was allowed to be taken from the island for cultivation elsewhere. If the crop was larger than the trade demanded and there was danger of lowering the price, immense stocks of the bark were burned or thrown into the sea. It is related that in 1760 a single pile of cinnamon-bark valued at £230,000 was burned, and later the price of the bark was actually raised to sixty-eight shillings an ounce. This is even worse than some of the stories told of the profiteers of the present day, who corner the provision market. Later, Ceylon was captured by the English, and they kept up the price of cinnamon for many years until in 1833 the monopoly was abandoned.

The cinnamon-tree is now grown in many other tropical countries. Great progress has also been made in its cultivation, so that we are now no longer dependent upon the supply of wild cinnamon brought from the jungles by the natives.

Garcia da Orta, a Portuguese traveler who visited Ceylon about 1537, writes of cinnamon, and his observations have been quaintly translated as follows:

The trees are about the size of olives, or rather smaller; the branches are numerous and not crooked, but somewhat straight. The flowers are white, the fruit black and round, larger than a myrtle, or between that and a nut. The *canela* is the second bark of the tree; for it has two barks like the cork-tree, which has bark and shell. The *canela* is the same except that the two layers are not so thick and distinct as in the cork-tree. First, they take off the outer bark and clean the other. The bark, cut in squares, is then thrown on the ground. When on the ground it rolls itself up in a round form, so as to look like the bark of a stick, which it is not. For the poles or sticks are the size of a man's thigh. The thickest of the bark is the thickness of a finger. It takes a vermilion color, or that which is given when burnt by the sun; or more like ashes mixed with red wine, very little of the cinder and a great deal of the wine. The trees are not so small as is stated by Dioscorides and Pliny, and they are numerous, so that the price is very low in Ceylon. For more than thirty years it has not been possible to buy any, except from the agent of the king. This year's bark is taken, and leaving the tree for three years it renews its bark. There are many trees, the leaves like a laurel. The trees that yield bad *canela* in Malabar and Goa are much smaller than those of Ceylon, and are all wild, growing of themselves. The root gives a water the color of camphor, and is considered to be cold. The king forbids the roots to be pulled up, so as not to destroy the trees.

His description of Ceylon is as follows:

The island of Ceylon is rather more than eighty leagues in circumference, and its length is thirty leagues, by six to eight broad. Some have said it is Trapobana or Sumatra. In front of its coast is the promontory they call Cape Comorin. It is very populous, though mountainous in many parts. The people are called Cingalese. It belongs to the king our lord, and the native kings are subject to him. It is certain that this island is the most noble in the world. It belonged to one king who was killed by his grandsons, and they divided it amongst themselves. When the Portuguese came to this land they took counsel to cut

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and sterilize many trees, such as nutmegs, cloves, and pepper. In this island there are all kinds of precious stones, including diamonds; and many pearls, as we shall state farther on. They have gold and silver, and do not wish to bring it to the kings, but to keep it for treasure. They say that they combine sometimes to withdraw it secretly. The woods are full of all the birds in the world, many peacock, fowls, and pigeons of many kinds, stags and deer, and pigs in great quantities. There are many fruits and orange-groves in this land, which is all mountainous, and the oranges are the best fruit in the world for taste and sweetness. The land also yields all our fruits, such as figs and grapes. Certainly very good profit might be made of the oranges, for they are the best fruit in the world. They have flax and iron. The natives say that it is the terrestrial paradise. They have a fable that Adam stopped on the top of a very high mountain which they call Adam's Peak. They have other fables much stranger. There are many palm-groves, and the elephants are the best in the world and very intelligent, and they say that the others which they have are obedient.

The odor of cinnamon, which we enjoy so much, is due largely to the presence of about 2 per cent. of a volatile oil, containing what the chemist calls cinnamic aldehyde. It seems to be generally conceded that much of the so-called cinnamon on the market is not the true Ceylon cinnamon at all but the bark of a related tree, the cassia, also of the laurel family. Cassia-bark is thicker, darker, and coarser, and consequently cheaper than that of the true cinnamon, and is exported principally from China, Indo-China, and India. Imports of cassia and cinnamon for 1921 were 5,426,183 pounds.

CLOVES.

The clove-tree was apparently a native of the Spice Islands, sometimes called the Malaccas, which lie a

little south and east of the Philippines in the Indian archipelago. The trade in cloves was established very early in the Christian era and has proved a source of great wealth to traders, especially the Dutch and Portuguese. As was the case with the commerce in cinnamon, the Dutch tried by all sorts of means to obtain a monopoly on the clove trade, even going so far as attempting to exterminate the tree in all of the islands except Amboyna, which they controlled. Finally, in 1770, the French succeeded in getting the clove-tree started in Mauritius and other islands, and it is now cultivated very extensively on the small islands of Zanzibar and Pemba, on the southeastern coast of Africa, and in the islands of Penang and Amboyna. The market is also supplied from the East Indies, Ceylon, and from some islands of the West Indies. It is useless to attempt to grow cloves in the interior of a continent, for the clove is a typical island plant and requires sea air for its successful growth. Because of its fancied resemblance to a nail, the French word *clou* has been applied to the clove.

No more beautiful trees are found in tropical islands than those upon which the clove is borne. An evergreen tree with shining oval leaves and rich clusters of crimson flowers would be an attractive object anywhere, but when the flower-buds develop, with their greenish color changing to bright red as the clove becomes sufficiently matured to be gathered, the beauty of the tree is still further enhanced. It is the custom to collect the flower-buds and dry

them to prepare them for the market. In Zanzibar and Pemba the cloves are spread on mats to dry in the sun, and on account of this they are often somewhat shriveled and of a dark color. In Penang and Amboyna, however, they are dried slowly over a wood fire, a process which causes them to retain their form and bright color. The Penang cloves are said to be of the highest quality.

Cloves are unique in containing such a large amount of essential oil, about 18 per cent., so that it is only necessary to rub the cloves between the fingers to make the presence of the oil apparent. This oil consists of about 90 per cent. of a substance which the chemists call "eugenol." In order to obtain it the cloves are ground and boiled with water, to which some salt has been added to raise the boiling point. The steam that comes over is condensed and put back several times into the still, so that finally all of the essential oil shall be extracted. The boiling is then continued and the condensed steam collected, when the oil readily separates out from the water upon standing.

It is stated, as a fact not generally known, that so great is the demand among the Orientals themselves for cloves and other spices that often the European and American markets get only what is left, and that is frequently an inferior product. In a single year 50,000 "frails" (135-pound packages) of Zanzibar and Pemba cloves were sent to India alone to meet the special demand during coronation festivities. We imported 4,362,773 pounds of cloves in 1921.

GINGER.

Why do we always associate energy, vim and snap, with ginger? Is it not because the root has the quality of sharpness, pungency, tang? Here is a plant known in Europe in very early times, mentioned in the Roman tariff lists and subject to duty in Palestine, in Spain, and in France in the eleventh and twelfth centuries, highly favored by the Italian merchants as early as the fourteenth century, yet always, up to that time, imported from India, China, and the Far East.

Since it grew readily in semi-tropical regions, the Spaniards, the indefatigable explorers and discoverers of those times, introduced the plant from the East Indies to their American colony of New Spain, and the cultivation was so successful there that it began to be exported from Santo Domingo as early as 1585. Ginger was then next in value to pepper, which had been for years universally used.

The ginger-plant, of which we use the underground stem, grows wild in southeastern Asia and the Malay archipelago, and has been cultivated especially in South America and the West Indies.

Just as we associate the lowlands of Holland with gin, so we associate the island of Jamaica with ginger because of the superior quality of the product grown there. This island has a mild climate, rich soil, and an abundance of rain at certain seasons of the year, all of which are needed for the cultivation of the plant.

A ginger-plantation is started by planting pieces

of the root as we plant potatoes. Leafy shoots rise from the underground stem, and separate shoots bear the rather inconspicuous flowers. The roots are dug in January.

Commercial ginger comes into the market in two forms. If the "races" or "hands," as the rhizomes are called, are simply washed and thoroughly dried in the sun, we have coated or black ginger. If, on the other hand, these roots are washed and the outer coating is scraped off before being sun-dried, the product is known as uncoated ginger. Sometimes the latter is bleached with sulphur fumes, or coated with whiting or lime sulphate, which may possibly serve to conceal inferiority.

The volatile oil and resins found in the ginger-root give it, as the physician would say, "stimulative, aromatic, and carminative" properties. Not only is it used medicinally, but as a flavor in cooking and for making crystallized ginger, ginger-ale, ginger-beer, and similar beverages. We imported 4,009,943 pounds of the unground root in 1921.

Another plant of the ginger family is the turmeric, and like the ginger it has an underground rootstock with an annual stem. We are apt to think of turmeric as simply a yellow coloring material because it has been used so much for dyeing purposes, but it is also valuable as a condiment, on account of the agreeable taste of the volatile oil which it contains. The presence of this flavor is one reason why it has been used for so many years as an important constituent of curry-powder. Turmeric originally came from the East Indies and Cochin-China.

PEPPERS

We have so far discussed an aromatic bark, a dried flower-bud, and a pungent root, but there is another important spicy product of the East, which is a dried berry. The pepper-plant is a climbing shrub, bearing a red berry. When this begins to color it is gathered and dried, in which process it shrinks and turns black—and this is what we call black pepper. Just as we can prepare a green or a black tea from the same leaves by different methods of curing, so we can make the black or the white pepper from the same berry. If the fully ripened black pepper-corn is soaked in water, it is then possible to rub off the outer skin, and we have what is known as white pepper, which is milder and less pungent than the darker variety. There is no doubt that pepper comes from the Far East, for we read on the invoices such names as Singapore, Sumatra, Malabar, Penang, Alleppi, Lampong, and Mangalone. Imports for 1921 were 33,848,840 pounds.

Like other spices, pepper contains an essential oil which is given off at ordinary temperatures and so readily flavors the food with which it comes in contact.

The nightshade family, which furnishes us with the potato and the tomato, contributes also to our list of spices, by giving us the capsicums or red peppers. More than four million pounds from different countries are annually imported into the United States. The genuine red pepper originated in tropical America, but it can be cultivated in almost any of

the temperate climates. Zanzibar and Japan have a reputation for furnishing the leading commercial varieties. We are all familiar with the taste of *chile con carne* and the other "hot" concoctions that have been introduced into this country from our association with our Spanish-Mexican neighbors on the south. Hungarian paprika is a favorite on account of the sweetish, mildly pungent flavor. From Spain comes the large-fruited pimento.

NUTMEGS

Those who are familiar with colonial housekeeping utensils will remember that no bride's outfit was considered complete unless she had been furnished with one of those shallow circular pewter boxes, provided with a tight-fitting hinged cover to hold the family nutmegs. This condiment was in great demand for apple-sauce, puddings, and many of the plain but toothsome foods of those earlier days.

We must go to the far-off Malay archipelago, to Madagascar, or the West Indies to obtain nutmegs. The tree grows something like an orange-tree, and like it is cut back and grafted. It does not bear flowers until about nine years of age, but when it once begins fruiting can be depended upon for a crop for eighty or more years.

The fruit is of a yellowish-green color and, when ripe, splits in two, showing within a kernel surrounded by a fleshy crimson covering—the mace of commerce. Within a second inner envelope is the nutmeg proper, which is separated after drying from its husk and becomes the well-known article of trade.

The white powder often noticed on nutmegs is there because the seed has been washed with milk of lime, or dusted with dry air-slacked lime. Importers contend that this liming prevents the attack of insects. In 1921 we imported 2,978,197 pounds.

Nutmegs differ from most spices in that they contain a large quantity (about 35 per cent.) of a fixed oil or butter which is a solid fat at an ordinary temperature. The agreeable flavor of the nutmeg is largely due to the presence of about 3 per cent. of a volatile oil, which may be distilled off with steam as already mentioned in the case of oil of cinnamon.



Courtesy World's Commercial Products

PLANTING YOUNG RICE PLANTS



Courtesy World's Commercial Products

IRRIGATION OF RICE IN SIAM



Courtesy World's Commercial Products

USE OF THE BAMBOO IN HUSKING RICE



Courtesy U. S. Department of Agriculture

MUNG BEAN-SPROUTS



Courtesy U. S. Department of Agriculture

MILLET (PROSO) CAKE

CHAPTER IX

LIVING WITH THE ORIENTALS AND PARTAKING OF THEIR FARE

IT may seem to be rather a hazardous experiment to accept the invitation of a resident of China, Japan, or the Straits Settlements to partake of his bill of fare, but, after all, there are so many things from these countries that we know and have welcomed to our own table for years that we should not be averse to trying a few of their less-known foods.

We can get a good idea of what the Japanese eat from a description by J. Alexis Schriver, of our Department of Commerce. Rice is the staple food, but barley, millet, wheat, and buckwheat are also used. We have no sauce, unless it is tomato catsup, that has so important a place as does soy, the sauce made from the soya-bean. We have become somewhat familiar with its flavor, as it is the basis of the well-known Worcestershire sauce. Soy is always on the table in Japan, and nearly every article eaten is first dipped in it to acquire some of its flavor.

The boarding-school girl, who with us is said to live on pickles, would be at home among the Japanese, for they pickle and eat a great variety of vegetables, especially radishes, cucumbers, egg-plants, and small turnips. For breakfast, instead of the American cereals, toast, and coffee, the

Japanese meal consists of *miso*, a soup made from strips of radishes, seaweed, eggplant, and other vegetables, cooked with bean curd and water, rice, pickles, and tea without sugar or cream. At other meals fish, dried or cured, when it cannot be obtained fresh, is usually served, with vegetable or fish soup.

Except in the case of a few strictly maritime countries it has been observed that in all lands the seed of some member of the grass family—some cereal—is cultivated as the staple food of the people. Nowadays we consider wheat the basic food of the civilized nations, and to attain this exalted position it has been improved by careful selection and in its advance in popularity has gradually driven out the coarser and cheaper grains. For the common people of Central Europe and Russia, rye has been for many years and still is the staple; there was a time when barley-flour and barley-meal were the chief breadstuffs of the inhabitants of northern Germany and even of Great Britain. Referring to the national diet of Scotland, Dr. Johnson once wittily remarked that oats are “a grain which in England is given to horses, but which in Scotland supports the people.” The North American Indians when discovered by European settlers were relying on maize, or Indian-corn, for their starchy food. Among the dwellers in eastern Asia and the adjacent islands, there is no cereal that holds so important a place as does rice.

MILLET

When we come to the cereal diet of the inhabitants of parts of China, Japan, India, and Africa, we find it to be a little seed, not much larger than the head of a pin, known as millet, a name coming from the Latin *mille*, a thousand, given to it because of the fact that there are such large numbers of tiny seeds in the head. This grain grows much like a grass and is so very prolific that one seed will yield an increase five times as great as a grain of wheat.

This abundant production must be what is referred to by Alice Cary in "Work":

With the hand on the spade and the heart
in the sky,
Dress the ground and till it;
Turn in the little seed brown and dry,
Turn out the golden millet.

It hardly seems credible, yet from what is known of the food habits of the peoples of the Orient, it appears that millet feeds one-third of the inhabitants of the earth. We in the Occident know virtually nothing of such thickly inhabited countries where the teeming millions toil for a mere pittance simply to sustain life. We can hardly appreciate the fact that Japan uses annually 35,000,000 bushels of millet, and that India sows from thirty-five to forty million acres with this cereal.

In our own country millet is sometimes cultivated for stock feed, but with the people of the East millet-bread or porridge is often the only thing that stands between them and starvation. This bread is nutri-

tious and palatable when fresh, but after a short time becomes dark and crumbles easily. We can and do, of course, raise all the millet for which we have a use in this country, and so it may be regarded as a foreign product, adopted as a human food only by foreigners. There are many varieties of millet and millet-like plants grown in different parts of the world, as for instance, the Hungarian or Italian millet, the Sanna-millet of India and Mexico, broom-corn, sorghum or durra, and Kafir-corn. The seeds of some kinds are used for human food, some as fodder for the lower animals, and some for the sugar contained in the green and succulent stalks. In China both a tall and a short variety are raised.

TARO (DASHEEN)

On account of our limited acquaintance with the root-crops used in different countries, we are likely to believe that the potato is the only suitable vegetable of this class and that nothing could take its place. In tropical countries, however, there are dozens of other roots used as human food, and some of them are of great commercial importance and form the principal starchy diet of millions of people. The use of the manioc has already been referred to. In warm countries, especially in the Orient and the Hawaiian Islands, one of the staple root-crops is the Taro, known also as the Trinidad dasheen. Since its introduction into the United States in 1905 it has become one of the important products in the agriculture of our own Southern States. It can be grown at small expense, and as it contains about 50 per

cent. more protein and 50 per cent. more starch and sugar than the potato it is really a cheaper food than the Irish potato, even if produced at equal cost. As the name "dasheen" is but a corruption of the French *de la Chine*, meaning from China, it is supposed that the root came at first from that country. Its true origin is rather uncertain, but we know that it was introduced into the United States from Trinidad. The dasheen plant appears somewhat like the familiar elephant-ear which grows in marshy places, but those who have tried them tell us that the tubers of the latter are not good eating. In flavor and texture when cooked the dasheen is something between the chestnut and the potato. Under the microscope its starch grains appear more like those of rice and are extremely small.

One peculiarity about the cultivation of the dasheen is that while it may be grown as an upland plant it does much better under irrigation. The roots grow best in a rich, moist soil where the fields can be flooded with water while the crop is growing.

Those who have traveled in the Orient, especially in Hawaii, will not fail to remember the dish called "poi" that is in such universal use among the natives. This is made by cooking the taro, peeling and grinding it in a mortar or mill into a sticky mass with a little water. When the paste becomes perfectly smooth it is put in a covered pot to ferment, or it may be made up into a kind of a mush or porridge. As a taste must be cultivated for this "poi" it is probable that among our own people the vegetable will for the present be used like the potato,

that is, boiled, baked, or scalloped. The dasheen starch could, if cheap enough, be used as a flour-substitute, but, thank fortune, the days of wheat-substitute breads are now over. Dasheen shoots are said to be very palatable, taking the place in the Orient of asparagus and suggesting in flavor the common edible mushroom.

There has been so far little appreciable importation of the taro into this country, although some have been brought into Eastern cities and to the South to supply the Oriental population. The bulbs have been shipped in small quantities from China under the name of "China potatoes."

BAMBOO SPROUTS

We are more familiar with the use of the bamboo to make fish-poles and canes than as a food product. Indeed, who that has seen, in semi-tropical countries, the thickets of bamboo crowded together and growing without branches straight to the height of fifty feet or more would suggest that they might be used for human food?

David Fairchild, in a recent article, says: "Thousands of hillsides in China are covered with bamboo-groves. Through their thin green leaves the sunlight falls with a greenish tint. Their plume-like stems rise fifty feet into the air and for thirty feet are without a branch—just jointed, brilliant, green tubes, the most fascinating thing in the world to put one's hands on.

"For decades these groves furnish to their owners an abundance of young shoots in the early spring,

shoots that are as good to eat as asparagus, and poles so light and from which so many things can be easily and quickly made that they belong in a class by themselves. This bamboo can be grown from the Carolinas to Texas, and there is no reason to doubt that our grandchildren will wander, as do the Chinese children, through beautiful groves of this wonderful plant."

Americans who sojourn in the Far East soon become as fond of this table delicacy as are the natives of these countries. The sprouts are cooked by boiling and served like asparagus. Creamed bamboo sprouts are much in favor with Orientals. One concern packs as many as seven hundred thousand cans annually, and no small quantity of them are served in "Chinese restaurants" as a part of those non-descript mixtures we all enjoy now and then.

BEAN-SPROUTS

Who ever heard of eating bean-sprouts? They may not be very popular with the native American, but they certainly have an extensive use, for numerous baskets of bean-sprouts are exposed for sale in the markets of California and in those of our Eastern cities that have a large Oriental population.

THE LOQUAT.

There is a delicious fruit, the loquat, belonging to the rose family and hence related to the apple, pear, and quince, which has not received attention in this country commensurate with its merits. Descriptions of this fruit, as found growing in Japan, were pub-

lished some two hundred years ago. It is probably indigenous to the moist regions of central-eastern China. At present there are many localities in that country where, as far as the eye can see, there is nothing growing but luxurious orchards of the loquat, which seems peculiarly adapted to these low, rich lands with their abundance of water. Dr. Alexander Kennedy, a missionary in Tangsi, said that in a single year twenty thousand dollars' worth of this fruit was exported from the vicinity of that village alone.

The loquat, like many of our own summer visitors, does best and seems to enjoy life most in a mild climate near the seashore. On the steep and breezy hillsides of Japan, especially around the Gulf of Kagashima, are some of the most famous loquat orchards of the world. For a thousand years this tree has flourished in Japan, but only gradually has it become known to the Western world.

The climate of England is too severe for growing the loquat, but it has become common in Italy, Australia, Hawaii, and Chile. The tree was introduced into our own country as early as 1889, but strangely enough it was prized rather as an ornamental tree than for its fruit. One reason for this may be that like the citrus fruits it is quite sensitive to low temperatures; and although the tree may grow luxuriantly, the fruit will not mature very far north. The loquat finds a congenial home in the Gulf States, especially in the vicinity of the ocean. A tree that is so injudicious as to blossom and set its fruit in December and January must seek a climate where

only light frosts occur at this time of the year. Since orchard heating and the use of smudge-pots has become so common in the orange-groves of California, this same procedure may extend the area of loquat growth to more northerly regions.

The leaves of the loquat are thick and leathery, as thus the tree can withstand a large amount of heat and drouth. Hot winds will, however, injure the maturing of the fruit. Although the loquat grows readily from the seed, the seedlings should always be budded to obtain a good variety of fruit. As the tree is very prolific and likely to overbear, in Japan it is a common practice to crowd the trees in the rows so as to dwarf their growth. The fruit grows in bunches, each fruit larger than a plum. It is oval in shape, and yellowish to reddish in color. It should stay on the tree until well colored.

For shipment the loquats are best packed in small orange-boxes and handled much as are citrus fruits. They have been shipped from California to the Eastern market, but the supply is not at present large enough to provide economical shipping arrangements, as is the case with oranges. A demand for a larger crop must first be assured.

What about the fruit itself, and its uses? The food value of the loquat, like that of most fruits, is not in its high calories, but there are other qualities that make it a valuable addition to the diet. The edible portion contains 85 per cent. of water, with 12 per cent. of fruit-sugar and less than 1 per cent. of cane-sugar. The skin is thin, and inside this is the fleshy pulp, surrounding a few rather large seeds

of irregular shape. The pulp has an agreeable sub-acid taste. Much of the fruit is sold for fresh consumption, but as it becomes better known there will be a greater demand for the loquat for making jams, jellies, and preserves, and for canning. It is rich in pectin, the gelatinizing principle of fruits, and as it contains considerable acid, lends itself very readily to the making of jelly. This is reddish in color, firm, and of excellent flavor. The juice may also be mixed with that of other fruits to vary the flavor. The use of the fruit is increasing very rapidly in California.

JUJUBE

In discussing the flora of China, Frank N. Meyers, agricultural explorer of our Department of Agriculture, speaks of the jujube as one of the most interesting of the Chinese fruits. There are several varieties of this plant which seem to grow wild in northern China. It is a spiny shrub or small tree, some varieties of which have been cultivated in parts of southern Europe as well as in western Asia. The jujube fruit is a drupe, varying in size from that of a small plum to that of a hen's egg. It is of a reddish-brown color, with a yellow pulp, and has a stone similar to that of the common plum. Some varieties are soft when ripe and have to be eaten within a few days, while others can be easily dried and in this condition kept for several months. The pulp improves in quality and flavor on storage. Some varieties are smoked like ham or herring and exported from Shantung Province as a much prized



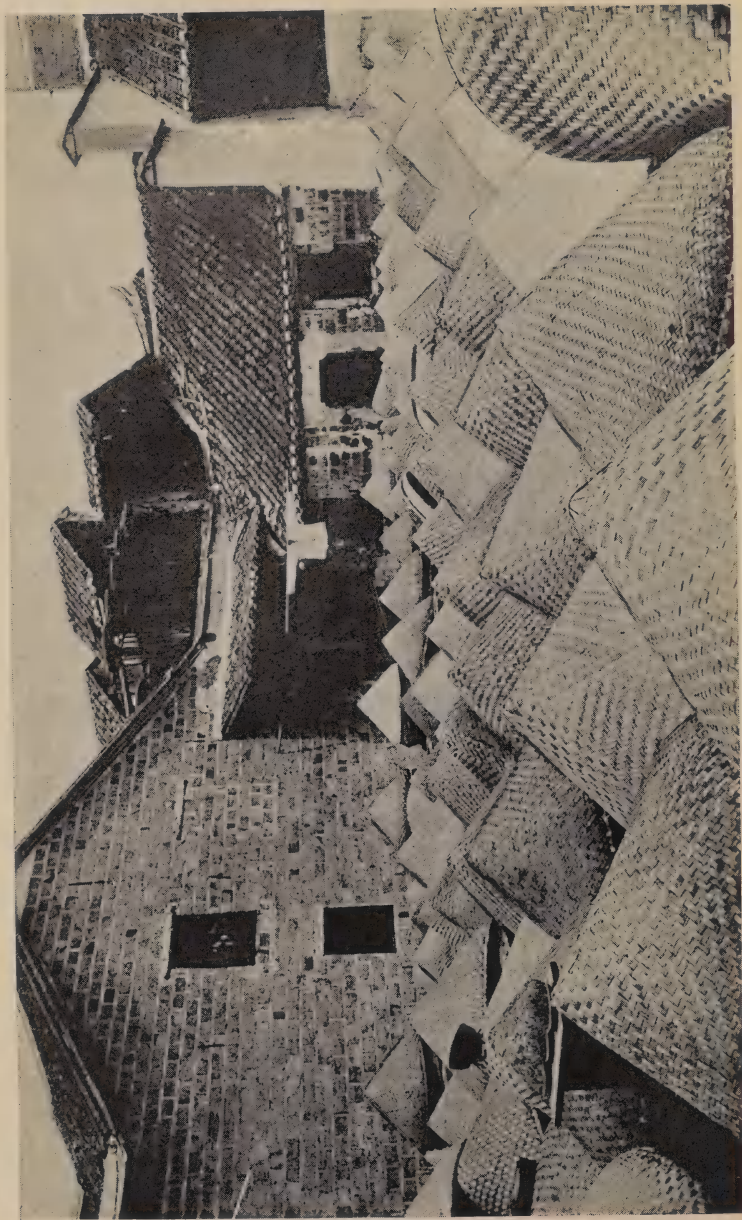
Courtesy Pan-American Union

PAPAYA-TREE



Courtesy U. S. Department of Agriculture

LITCHI-TREES AND FRUIT



Courtesy U. S. Department of Agriculture

MAKING SOY-BEAN SAUCE

sweetmeat. Other varieties are preserved with sugar and honey, and in this condition compare favorably with Persian dates. Preserved jujubes are served in the best Oriental hotels and on the first-class steamers plying between Eastern ports. The dried fruit is used in the Mediterranean regions as a winter dessert and is very popular for its refreshing acid flavor.

A jujube-paste was formerly imported into this country and western Europe. This was made of gum-arabic and sugar evaporated to a paste with a decoction of the jujube fruit, which gave the confection its fine taste. But, alas! the jujube confection which is now on the market, especially in England, is made from gum-arabic, gelatin, sugar, and some artificial flavor, and is said to contain none of the real jujube pulp. There is one variety of this fruit which is a native of northern Africa and southern Europe and is largely used by the Arabs. They dry the fruits, pound them to remove the stones, and make the pulp into a cake having the color and flavor of gingerbread.

An illustration of one of the Oriental uses of the jujube is shown in the cut, which is an immense cake made of proso, or millet, and jujubes boiled together. This is sold to the natives at less than a penny a slice.

As to the growing of the jujube in this country, experiments show that it can be cultivated satisfactorily in the Southwest, particularly in Texas, New Mexico, Arizona, southern California, and

southern Utah. Some varieties, notably those grown in Texas and California, prove very fruitful and have readily withstood our climate.

PERSIMMONS.

The persimmon is another fruit which has been cultivated to such an extent in the Far East that in the fresh and dried state it is of as much importance on the market there as is the peach with us. This fruit seems to belong to both hemispheres, for it grows wild in Japan and China, as well as on this continent from southern Ohio down into Mexico. By cultivation and careful selection the Japanese gardener has developed a luscious reddish-yellow fruit as large as our apple, which we do not at first recognize as in any way related to the wild persimmon of the Ohio Valley and the South. The Southern negroes wait until the early frosts tinge the woods and the leaves of the persimmon tree have fallen; then when the fruit glistens on the naked branches an abundant crop can be gathered by shaking the trees or thrashing the branches with poles; whence the proverb, "The longest pole gets the persimmon," so often applied to the means used to win success.

It is not really necessary that the frost should touch the fruit to change the puckery, astringent taste caused by an excess of tannic acid to the sugary flavor so much appreciated. In fact, many varieties of persimmons ripen where there is no frost at all.

The Japanese have an ingenious method of artificially ripening persimmons by placing them in an

empty cask from which the *saké*, or native beer, has been recently drawn. A study of this process led investigators of the Bureau of Chemistry to decide that this effect was produced by the small quantity of carbon dioxid gas that was left in the cask. Experiments confirmed this theory, and now persimmons may be rapidly ripened in an atmosphere of this gas by merely placing them in chambers filled with it. The Japanese dry this fruit in the same way that figs are dried and export the product to other countries.

Horticulturists have been very successful in raising the Japanese varieties of persimmon in California and the Southwest, and the persimmon is coming into our markets in increasing quantities every year.

LITCHI-FRUIT

In Chinatown, San Francisco, and in many of our larger cities where the Oriental population is large, dried litchi-fruits or nuts have become quite a common article of merchandise. We always associate this fruit, and its peculiar sub-acid, slightly smoky flavor, with the Chinese. As children many of us remember how the boy who did not call "Ching-chong-Chinaman eats dead rats" at the town laundry-man was rewarded by a few of these strange nuts "with a candy inside."

There are no less than sixteen species of the litchi, so that the descriptions sometimes given do not seem to tally accurately, as they refer to different varieties. The fruit is usually globose, having a dull brick-red pericarp which when ruptured discloses

a sweet white mass surrounding a glossy chestnut-brown seed. Although sometimes called a Chinese nut, it is really a fruit.

Besides its use as a fruit, the Chinese serve this dried so-called nut as a sweetmeat at their feasts, and often give it as a ceremonial present to newly-married couples. They use the fruit in tea, on account of its sub-acid flavor; in fact it does combine to some extent the sweetness of sugar with the acid of the lemon, so that the addition to tea is very appropriate. Its food value lies in the sugar and starch content, which is about 77 per cent. The acid flavor which makes the taste so agreeable is due to the presence of citric acid, the acid found in lemons. None of the jelly-forming pectin, so common in most fruits, is present.

The litchi is grown in China, India, and the Malay archipelago, but there does not seem to be a sufficient demand for it with us to introduce it into the list of fruits "grown in the United States of America."

DURIAN

There is a fruit, somewhat oval like a cocoanut, which is produced on trees sixty to seventy feet high, found growing in the Malay archipelago, and cultivated in the East Indies, the Malay peninsula, and Siam. This fruit, the Durio or durian (from Malay *duri*, a thorn), is very popular among the Dyaks and with the Europeans who live in the East, but is little known elsewhere. Alfred Russel Wallace, the naturalist, in describing it, says: "The fruit is round or slightly oval, about the size of a

large cocoanut, of a green color, and covered all over with short stout spines, the ends of which touch each other, and are consequently somewhat hexagonal, while the points are very strong and sharp. It is so completely covered that if the stalk is broken off it is a difficult matter to lift one from the ground. The outer rind is so thick and tough that from whatever height it may fall it is never broken. The interior of the fruit is filled with a mass of cream-colored pulp, imbedded in which are two or three seeds the size of chestnuts. This pulp is the edible part, and its consistence and flavor are indescribable. A rich butter-like custard flavored with almonds gives the best general idea of it; but intermingled with it come wafts of flavor that call to mind cream-cheese, onion-sauce, brown sherry, and other incongruities. Then there is a rich gelatinous substance in the pulp, which nothing else possesses, but which adds to its delicacy. It is neither acid nor sweet nor juicy, yet one feels the want of none of these qualities, for it is perfect as it is. It produces no nausea or other bad effect, and the more you eat of it the less you feel inclined to stop. In fact, to eat Durio is a new sensation worth a voyage to the East to experience. When the fruit is ripe, it falls off itself; and the only way to eat Durios in perfection is to get them as they fall, and the smell is then less overpowering."

Says Mr. Wallace, "If I had to fix on two fruits only as representing the perfection of two classes, I should certainly choose the Durio and the orange as the king and queen of fruits."

When the fruit begins to ripen, it falls daily and

almost hourly, and accidents not infrequently happen to persons walking or working under the trees. When the Durio strikes a man in its fall it produces a dreadful wound, the strong spines tearing open the flesh, while the blow itself is very heavy. No serious attempts have been made to cultivate the Durio in the Central American countries.

PAPAYA

In these days when the chronic dyspeptic walks among us and when the vegetable, animal, and mineral kingdoms are being investigated to find a food or medicine that will stimulate the lagging digestive system to new and victorious attacks on the endless variety of food presented for approval and disposal, it is refreshing to find that in some countries in the Far East there is a digestive ferment or enzyme prepared in nature ready for use. This is the papaya, or as it is sometimes called, the pawpaw. It is in no way, however, related to the American fruit of that name.

The papaya, which is about the size of a small melon and of a greenish color, is a favorite breakfast-dish for travelers in southern India, Siam, and Ceylon. Not only does it contain the digestive ferment papain, but it is itself a luscious appetizer. As soon as the fruit is cut, it must be scored several times with a knife; otherwise the juice hardens and looks like tapioca. The papaya cannot be kept even in cold storage more than three days after it is picked, so that it never appears in our American markets. As an illustration of the digestive quali-

ties of the papaya, it is said that the milk or even a decoction of the fresh leaves will render the toughest beef tender in two hours. In Siam your cook will wrap raw beef in papaya-leaves for half an hour before cooking, or put a piece of the green fruit into the stew when the meat will not boil tender. It will digest ten or twelve times its weight of egg albumen. The pure ferment may be prepared from the fruit, and as a medicinal product has been placed on the American market. But there are other uses for the papaya; it intensifies color if used in washing black clothing, makes an excellent cosmetic, or can be utilized for making soap. In order that the Occidental world may have the use of this remarkable fruit, the milk or juice is dried and canned. Thus the canned papaya now finds a place in the world's markets, and if you are really anxious to become acquainted with it you can probably procure it from your delicatessen dealer.

CRABS.

Crab-meat in tin cans is often imported from Japan, but few of us are aware of the details of the process by which it is prepared for foreign markets. The principal factories are located on the island of Komjuro. Crabs are caught usually in the autumn and winter seasons, at a distance of from twelve to fourteen miles off the coast, in comparatively deep water. "Flounder-nets," as they are called, which are really large sack-shaped bags with a mouth opening perhaps ten feet in width, are trailed behind the boats. The catch is from three hundred

to five hundred crabs a day for each boat, but the day is a long one and the work of rowing the boats and hauling in the nets is very laborious. Do not imagine that the Japanese crabs are little fellows such as are caught so readily along our Atlantic coast. The "babies" often weigh eight pounds, and many of the "old ones" are as big around as a bushel basket and weigh more than thirty pounds.

In Japan many of the canning-factories are small and in reality a part of the dwellings of their owners. It is a cheering fact to know that the Japanese carry their proverbial cleanliness into the canning industry. The crabs are boiled and the meat is picked from the shells by women and girls. It is packed into the cans and heated under pressure for an hour at 228 degrees. The cans are then taken out of the kettle, vented by punching a hole in the top, resoldered, and reprocessed for something more than an hour under pressure. Crabs are usually put up in lacquered cans, and the meat is protected by being wrapped in parchment-paper to prevent blackening, which often occurs when it comes in direct contact with tin-plate. Imports for 1921 were 2,580,657 pounds.

SHRIMP.

Shrimp are also canned for export in Japan. They are caught in trawl-nets, having a one-third inch mesh. It is an interesting fact that this shrimp-fishing is always done on dark nights only, probably because the water is so clear that the boats and nets could be readily seen by the crustaceans from the



Courtesy T. C. Whitney Co.

TEA-PICKING IN FORMOSA



Courtesy T. C. Whitney Co.

PLANTATION IN CEYLON



Courtesy T. C. Whitney Co.

FIRST FIRING FOR THE BLACK TEA



Courtesy T. C. Whitney Co.

WEIGHING THE TEA

bottom thirty feet below. At any rate, the shrimp refuse to be caught on moonlight nights.

From the fishermen's boats the shrimp are transferred to pots or tanks of boiling water at the canneries and cooked. They are next dumped upon tables, and the meat is removed by the women who generally are employed for this work. For first-class goods the shrimp are placed in thin cotton bags, and then in a lacquered can which is lined with parchment-paper. This precaution is taken to avoid blackening the product, an effect said to be due to the presence of phosphorus in the food. Shrimp and prawns as canned in Japan are "dry-packed," that is, without the addition of any salt and water, as most of us know, and are then processed under pressure.

An agent of the United States Department of Commerce says: "If the export of crab-meat to the United States and imports of condensed milk from the United States are disregarded, there is a big balance in favor of Japanese canned products. This is because there are so many more Japanese in America than Americans in Japan, and the people of each nation have a prejudice in favor of canned foods from their own country."

EDIBLE BIRDS'-NESTS

As a real luxury and an expensive one, the Chinese waiter will serve you edible birds'-nests. These are a very delicate semi-transparent substance made by certain swallow-like birds known as *salangane*.

These birds nest in almost inaccessible holes in the cliffs overhanging the sea, especially in Siam and the Malay archipelago. The nests are made from a variety of algæ, gathered by the birds. This is very laborious work, requiring three months of tireless industry on their part, and just before the birds are ready to lay their eggs the nest is stolen by the natives. Undaunted, the birds build another nest, strange as it may seem, in thirty days; this is also stolen, but the third nest is left unmolested, that there may be at least one brood of young and no danger of exterminating the little manufacturer of their titbits.

In preparing the birds'-nests for the table, they are washed in cold water, cooked for eight hours in a closed vessel, mixed with chicken-broth, seasoned, and boiled again. This delicacy is very popular with Occidentals as well as with the natives who have been accustomed to it all their lives.

TEA,

Tea does our fancy aid,
 Repress the vapors which
 The head invade,
 And keeps the palace of the soul serene.

The gracious summons, "Tea is served," comes to the tired laborer calling him to rest and relaxation as well as to the ladies of "high degree" who "toil not, neither do they spin." Throughout the Oriental and English-speaking world it is the summons to sociability and exchange of gossip. Sydney Smith said: "Thank God for tea! What would

the world do without tea? I am glad I was not born before tea."

It was ages ago that the virtues of tea were discovered. Kieulung, in the fourth century, after telling how to make the beverage, said: "At your ease drink the precious beverage so prepared, which will chase away the five causes of sorrow. You can taste and feel but not describe the state of repose produced by a beverage thus prepared."

One species of the herb has been found growing wild in the mountain ranges of Assam, a province of India, and some have argued that this was the original source of the plant.

How did the knowledge of the use of tea spread to Occidental lands? Probably Moorish travelers were responsible for the introduction of tea into Mohammedan countries as early as the tenth century.

Adam Olearius, writing in 1631, has told us how the Persians frequented the taverns to drink "thea" or "cha" which the Tartars had brought from China, "imagining that it alone would keep a man in perfect health."

Those of us who have not forgotten our history will remember that there was a time when the Portuguese were the greatest voyagers, discoverers, and colonizers of the world. It is not strange, then, that these adventurers, as early as 1559, brought from the East to Europe the knowledge of the virtues of the "chia," a beverage which they said the people of China prepare and "which is extremely whole-

some against phlegm, langor, and a promoter of longevity."

The Dutch East India Co. manifested their usual "sagacity" in their transactions with the Chinese. On one of their voyages they carried a quantity of sage, and telling the unsophisticated Chinese that this bland garden herb contained all the virtues of their tea, they induced them to exchange three or four pounds of Chinese tea for one pound of sage.

About 1658, partly through Dutch travelers and partly through direct importation, tea came into such general use in England that we read attention was called to "that excellent and by all physicians approved China drink called by the Chineans 'cha,' by other nations 'tay,' sold at the Sultaner's Head, the Cophee-House by the Royal Dutch Exchange, London." From this time on the use of tea in Great Britain has increased continually until to-day the annual importation into England provides for seven pounds per capita. It has become a national beverage.

Was there ever a chapter in American history that more graphically tells the character, the loyalty, and the determination of the colonists than what is facetiously called the Boston Tea-party? The story is known and delighted in by every schoolboy, who would like to have been "in it." As an act of defiance against "taxation without representation" it startled the world and laid the foundation of a federation of States, or as J. M. Walsh expressed it: "From the minute the first tea-leaf touched the

water the whole atmosphere surrounding the issues involved changed! In that instant, with the rapidity of thought, the Colonies vanished and America arose."

We are all more or less familiar with the growing and curing of tea. We know perhaps that Japan, China, India, Formosa, Ceylon, and Java are the only countries where tea in any commercial quantities is produced. We have probably learned that the two kinds of tea are the unfermented or green and the fermented or black, and that Japan is the only country that produces only green tea. From the same plant and the same leaves we can obtain either green or black tea, the difference depending upon the method of curing the leaves. Imports of tea for 1921 were 76,486,766 pounds.

The tea plantations of the East are beautiful to look upon. The evergreen shrub is started from the seeds which are grown in the nursery, and the small plants are set out in rows about four feet apart. As they grow they are vigorously pruned so that numerous young shoots form. The leaves may be picked after the plants are three years old, and the picking is repeated as often as young leaves are produced.

It seems rather difficult for us to understand the names of the different kinds of tea and the methods used in grading. We can remember something about this, however, by referring to the illustrations. Unfortunately, though, the part of the twig known by one name in one country is called by another name in other countries. In the illustration the name

above the leaf is that used in India, Java, and Ceylon, while that below the leaf is the Chinese name. Different grades are obtained not only by this selective picking of leaves but by sifting and picking over the finished tea, thus giving samples having various degrees of coarseness.

The tea-growers of Japan, China, and Formosa in making green tea, after allowing the fresh leaves to wilt, carry them at once to a room where heat can be applied so as to close the pores and stop evaporation of volatile substances. The leaves are shaken in a shallow pan above a fire of hot coals, much in the same way as we pop corn, only at a lower temperature, all the time being constantly stirred with the bare hands. When heated sufficiently the leaves are transferred to bamboo tables, where they are rolled and curled by hand until sufficient moisture has been driven off. They are then dried more thoroughly over the charcoal fire, and if treated properly will retain their green color.

If black or fermented tea is to be prepared the natural sap is allowed to remain in the leaf for a time after it is picked, and to this end the leaves are spread out in the air on large mats for twenty-four hours and cured much as we dry hay. They are then heaped and allowed to stand for an hour or more until finally they have darkened in color and emit a fragrant odor. They are then fired several times, exposed to the air, and finally curled, rolled, and afterwards sifted and graded.

The most characteristic constituents of tea are thein, an alkaloid identical with the caffein of coffee,

volatile oil, to which the odor and flavor is largely due, and tannin, an astringent. This "puckery" substance, which is more abundant in green teas than in black, is present in greater quantity on account of the different processes used in curing the green and the black tea. In making the beverage freshly boiled water is poured over the tea, and it is allowed to stand in contact with the leaves for a short time only. The use of the "tea-ball" is to be particularly recommended.

CHAPTER X

A FRESH CARGO FROM TROPICAL ISLANDS

INTO the harbor of San Francisco through the Golden Gate come the vessels from Hawaii and the Philippines laden with sugar; past the Statue of Liberty and into the port of New York sail the vessels from Continental Europe, from the West Indies, and Central America; and into our Southern ports come vessels from the torrid bays on the southern shore of the Gulf of Mexico, all laden with raw sugar. This comes to us partly for refining and reëxport and partly for home consumption.

In normal times all these foreign nations and our non-contiguous territories have contributed to help fill Uncle Sam's sugar-bowl. The non-contiguous territory furnished 140,000,000 pounds more sugar in 1917 than we raised at home. The island of Cuba alone in 1917 sent us 44 per cent. of all the sugar we consumed. Porto Rico, Hawaii, and the Philippines sent us 2,407,875,006 pounds, and other outside countries provided 5,064,806,051 pounds. We raise only 26.7 per cent. of the sugar which we use, so with all our encouragement to the industry sugar is still very largely a "foreign food." The sugar trade of the world in 1921 was perhaps more nearly normal than that of many other commodities, and still we im-



Courtesy T. C. Whitney Co

HOW THE DIFFERENT GRADES ARE OBTAINED



Courtesy T. C. Whitney Co.

STEAMING GREEN TEA LEAVES



Courtesy U. S. Department of Agriculture

PINEAPPLE FIELD



Courtesy World's Commercial Products

SUGAR-CANE GRINDING

ported only a little more than 5,967,000,000 pounds against 7,674,000,000 in 1920 and nearly 7,000,000,000 pounds in 1919. Our exports of refined sugars, which include a small amount of maple-sugar, were for 1921, 862,500,000 pounds and for 1919, 1,376,200,000 pounds.

There was a time—it seems to us that it must have been very long ago—when almost the only representative of real sweetness was “honey and the honeycomb.” The bees,

Seeing only what is fair,
Sipping only what is sweet,

had achieved the art of concentrating sweetness from the flowers long before man learned of any process of concentration. He was content with the fruit-sugars from dates, figs, and other tropical plants. It is true, the North American Indians had learned to boil down the sap of the sugar-maple tree and from it made a syrup and sugar ages ago. We do not know when they achieved this miracle, but the Yankees were not long in picking up the art and utilizing it to the fullest extent to furnish the common sugar for the table. They never imagined that the day would come when on account of its agreeable flavor maple-sugar would be worth two or three times as much as cane or “West India” sugar.

The sugar-cane probably originated in India or some part of eastern Asia, in a sub-tropical climate. The Arabs introduced its culture into Egypt, where it spread along the Mediterranean to Sicily and Spain. Early in the sixteenth century sugar-cane

was taken to the western hemisphere, and from Brazil to the West Indies, and finally to the United States in 1750. It was not until 1822, when steam mills for grinding the cane were first built in Louisiana that the cane-sugar crop became of commercial importance in our country. It is interesting to trace the introduction of sugar into the civilized world. First it was a curiosity to be presented to royalty, then it came into use as a medicine, then a luxury, and finally a necessity, retailing in normal times at less than five cents a pound. It is only in the last twenty-five years that the food-value or energy-producing power of sugar has been appreciated.

The sugar-cane is propagated by cuttings, and these grow very rapidly in the warm, moist climate of semi-tropical countries. The cane is cut in the late autumn and winter in Louisiana; the leaves and tops are removed, and it is crushed between sets of very heavy steel rollers to press out the juice. As this juice is quite impure it must be treated with burning sulphur fumes or bisulphite of lime and heated with lime. This produces a scum which causes most of the impurities to separate out so that they can be filtered off in a heavy filter-press. The clear juice is next concentrated in "multiple-effect" vacuum-pans, and finally boiled down in a large vacuum-pan heated with steam-coils, until it is concentrated enough for the sugar to crystallize out, giving what is known as the *masse cuite*, or boiled mass.

To separate the sugar from the molasses in this

masse cuite the material is put in "centrifugals,"—cylindrical baskets with sides made of perforated metal,—which spin on a perpendicular axis at the rate of 1000 revolutions a minute. This causes the molasses to fly out of the sugar and leave it nearly dry. The molasses is again boiled down and centrifuged for a second and third crop of sugar.

Much of the sugar coming from the plantations, and especially that from non-contiguous countries, is what is known as "raw sugar"; that is, it is brown and contains a quantity of impurities, so that it must be refined to give the "granulated" sugar of commerce. To refine the sugar it is dissolved in water, filtered through bleaching carbons, and again concentrated in vacuum-pans to crystallization. Formerly the moist sugar was put in conical molds, and when drained was washed with a saturated solution of pure sugar to remove impurities. The contents of these molds was then dried and broken for "lump-sugar," ground and sifted for "granulated sugar," or sawed into cubes for cut or "cube-sugar." A more modern method of making the cube-sugar is to press the moist granulated sugar into a mold and then saw this slab into blocks by the use of gang-saws.

The sugar-beet is another source of "cane-sugar," not as old as the sugar-cane, but gradually becoming more important to the civilized world. Nearly two centuries ago a chemist surmised that this kind of beet contained enough sweetness to make it worth while to raise it for sugar-making, and subsequent developments have more than borne out his

prophecy. The beet grows in the temperate region where the sugar-cane does not flourish. In the United States it has been successfully cultivated where the average temperature of June, July, and August is about seventy degrees Fahrenheit. It grows well in France, Germany, Austria, Poland, and Russia.

The advantage of making sugar from a crop that could be produced in the temperate zone was early realized, and when Marggraf in 1747 announced that the sugar-beet contained the same kind of sugar as the sugar-cane, the possibility of utilizing this source was discussed. Nothing came of it for a while, but finally Napoleon I in 1806 caused a bounty of a million francs to be offered for the satisfactory production of sugar from home-grown plants. This stimulated the industry; the beet was studied and improved by careful selection, so that instead of yielding from 2 to 3 per cent. of sugar as at first it now yields as high as 18 per cent.

In the manufacture of beet-sugar there is very little similarity to the process used in getting sugar from cane. The beet's juice cannot be squeezed out from the pulp, so that the sugar is leached out with water by what is called the "diffusion process." The roots are cut into small pieces called "cossettes," and these are soaked in a current of warm water in large iron cylinders until nearly all the sugar is extracted. This sweet dilute liquid is heated to coagulate the albuminous substance present, and lime is added. Carbon dioxid is then passed through the solution, and it is forced through a filter-press.

Then the sweet juice is filtered again, but this time through bone-black to take out the color. After boiling down and separating some sugar, the molasses resulting is treated with quicklime, filtered, and the lime-sugar compound which has been filtered off is treated with carbon dioxid gas to separate the sugar. This seems a complicated process, but it is necessary because the juice of the beet contains a variety of impurities that are not found in cane-juice, and it is difficult to separate the pure sugar from them. In the modern manufacture of beet-sugar there is no "raw" or crude sugar produced. At the beet-mill the roots go in at one end, and a fine-grained granulated sugar, ready for the market, comes out at the other.

There is still another commercial source of sugar, that made from the juice of half a dozen varieties of palm. This is virtually all used in the countries where it is grown, so we do not know it on the American market. This sugar comes from the palms growing in India, China, Ceylon, and the East. The juice, which is called "toddy," is drawn off into jars by natives from incisions in the tree or just below the blossom. Lime is then added to the juice to clarify it and it is boiled and filtered. When concentrated, the juice yields the moist brown sugar (called "jaggery sugar"), which is in common use among the natives.

As this palm-juice contains albuminous matter as well as sugar, of course it ferments readily, and it did not take the Hindus, Malays, and the other Eastern peoples long to learn that a palm-wine, which

was quite intoxicating, could be made from it. The next step was to distill this fermented juice to make a fiery alcoholic liquor similar to rum. This is known locally as "arrack."

With high prices for sugar and a protective tariff, the cane-growing regions in our Southern States will continue to make cane-sugar at a profit. In normal times it has been found difficult for these planters to compete with the sugar-growers of more tropical countries, as Cuba, Hawaii, and the Philippines, where labor is cheaper and where the cane sprouts from year to year with less care and not such frequent plantings as are necessary in the States.

The area for the growth of the sugar-beet is constantly increasing, although it is also true here that the industry has been recently stimulated by high prices.

PINEAPPLE

One of the most valuable fruits of tropical and sub-tropical lands, and one which has recently been brought into special notice by its extensive cultivation in Hawaii, is the pineapple. The growing of this fruit has not been considered an industry of the United States; indeed, Whittier has sung,

Let other lands exulting glean
The apple from the pine,

yet, as will be seen later, there are some sections of the United States where pineapples can be and actually are commercially grown. It is evident from the study of the origin of this fruit that it came

originally from tropical America, probably the West Indies, and has gradually spread throughout other southern countries and the eastern hemisphere.

The first mention of the pineapple in English literature is when a specimen from the Barbados appeared on the table of Charles II, but it was not grown in England until 1712, and nowadays its cultivation there is not profitable. In our own country the sailing vessels that supplied the Atlantic ports, even a hundred years ago, with tropical products from the West Indies or the Bahamas always included in the cargo a liberal supply of "pines." At present our fresh pineapples come mostly from Florida, Cuba, and Porto Rico, and the Pacific shore is supplied from Hawaii.

For distribution as a fresh fruit the pineapple must be cut before it is really ripe in order to bear transportation. Because of necessity for gathering the pines while still slightly green they come to our tables lacking some of the sweetness so characteristic of the fully ripened fruit. In this respect pineapples differ from bananas, pears, and some other fruits which are really better if not allowed to ripen on the tree.

The process of ripening has been studied at the Hawaii experiment station, and it was learned that the sugar-content increases only so long as the fruit is in connection with the "laboratory" of the leaves,—the place where the sugar is made—and that after the pines are picked no more sugar develops. If picked green the fruit contains only about 3 per

cent. of sugar, but if allowed to ripen properly on the plant it may contain from 9 to 15 per cent. With the increase of sugar comes the improvement in flavor, owing to the manufacture of essential oils and ethers. As Henry T. Finck, speaking of the pineapple, puts it: "In the South, where this luscious fruit grows, its fragrance at the time of ripening pervades the whole neighborhood. In our markets the pineapple's perfume is so faint that you have to flatten your nose against it before you get any at all. The reason is that these 'pines' not only are usually of the inferior sort, but that they are picked and shipped before they are ripe." It seems to be a recognized fact among growers and dealers that the best varieties, because of this delicacy and juiciness, are more perishable, so they are less frequently grown or shipped.

To the uninitiated there would seem to be no connection between the pineapple and the graceful Spanish moss which hangs in lichen-like festoons from the live-oak and other trees of the South, yet they belong to the same natural order of plants. The only excuse for the name pineapple is the resemblance that the fruit bears to the pine-cone. This fruit is peculiar in that the original separate flowers with the bracts supporting them, in the process of growth and fertilization, become consolidated into a fleshy, succulent, delicately flavored mass.

The trees, if trees they may be called, are propagated by crowns, slips, or cuttings. About eighteen months after the plants are set out the grower may expect his first crop. The crowns are planted in

rows, where they can be cultivated and require generous fertilizing to insure a paying crop. When the first crop is cut 'ratoons' or sprouts start out between the leaves below the fruit. Two of these are allowed to grow, and the rest are broken off and used for starting new plants. A third ratoon-crop is sometimes allowed to grow, but usually the ground is plowed and new plants are set out.

The story of the pineapple-canning industry of Hawaii gives us a striking illustration of the advantage of putting up where they grow the perishable foods native to a warm climate. Thus by packing in hermetically sealed cans great quantities of a most delicious fruit, much of which would otherwise have been wasted, have been made available for the dwellers in less favored climes many miles away. As has been stated, the ripe fruit with its delicate flavor will not bear transportation, but by canning we catch and imprison nearly all its delicious qualities, because the planter waits until it is fully ripe before picking. The history of the industry is interesting. It was in Baltimore in 1900 that the pineapple-canning industry in the United States reached its high-water mark—sixty-five boatloads of from 4500 to 15,000 dozen pineapples each arrived at this port. These came mostly from the Bahama Islands, and later, as these shipments declined, they came from Cuba. Although at present the Baltimore output has greatly declined, yet these packers are still putting on the market from fifty to seventy-five thousand cases annually.

At present the great supply of canned pineapple

comes from Hawaii, and the next largest, little of which, however, reaches this country, goes from Singapore and the Straits Settlements. It is only since 1907 that the Hawaiian canning industry began to be of commercial interest, and since then, fostered by a well managed packers' association, it has had a phenomenal growth. The factories are situated mostly on the island of Oahu. The plantations are located at an altitude of five hundred to twelve hundred feet, or somewhat higher than the land used for the production of sugar-cane. Although the fruit is canned throughout the entire year, the greatest pack is put up from May to September. The latest machine for preparing the fruit not only pares it but removes the core and "sizes" it to the proper diameter to fit the can. The market at present seems to demand that the slices shall be three and one-half inches in diameter, so that all fruit is cut down to fit containers that size. The ordinary canning methods are employed, great caution being used to have the product clean and sanitary in every particular. After the required amount of syrup has been added, the sealed or capped cans are conveyed to the processing-tank, where they remain for fully thirty minutes.

Formerly the portion pared off from the fruit was wasted, but now it is put through a machine that macerates the pulp and separates it from the rind and eyes, and this material is put upon the market as "grated" or "shredded" pineapple. The grated product, since it comes mostly from the outside of

the fruit where it has been exposed to the sun, is really the choicest part of the fruit.

American ingenuity is shown still further in the utilization of the by-products. The core, which in the Hawaiian pineapple is neither stringy nor tough, is made into a chocolate-covered or glacé pineapple, much in demand by the confectionery trade. The juice, rich in sugar and flavor, which has run out but not wasted during the process of cutting and handling, is finally utilized. It is estimated that formerly at one of the large canneries no less than ten thousand gallons daily was pumped into the sea. Now this juice is carefully filtered, then heated to the boiling-point to sterilize it, and processed in bottles without any further treatment. It has sufficient sugar (7 per cent.) so that it is ready to be used directly as an iced beverage. Another use made of the juice is in a concentrated form as the syrup for filling cans of slices where it now replaces the cane-sugar solution formerly employed. After experimenting with some other varieties of pineapple for canning, that known as the smooth cayenne was selected and has been found very satisfactory.

As a food the dietetic value of the pineapple has been greatly praised. It contains what is known as a "proteolytic enzyme," a ferment which acts directly on the albuminous matter of our food, such as that found in meat, milk, or eggs, and converts this into the peptones and proteoses, as they are called. These are intermediate products in the process of digestion.

BREADFRUIT

No story of the indolent life of the South Sea Islands is complete without mention of the breadfruit, and no picture of these lands is supposed to be true to life unless it depicts the native in holiday undress lazily picking his breakfast, dinner, or luncheon from the overhanging boughs of this tree. The fact is that this fruit is just as much the staple food in many of the islands as are cereals with us. It is globular in shape, about the size of a melon, and grows on a medium-sized tree, which requires little if any cultivation.

There is, however, a "winter of discontent" even in this favored clime for it is only through eight months of the year that the natives can pick the fruit and "eat and live." They must make provision in some way for the other four months of the year, for nature, however, bounteous, will not feed them all of the time. One way of preserving the breadfruit is to cut it into slices and dry it; this material, which keeps well, may be ground in a rough mortar and used for making bread or puddings. The native usually stores the fruit in pits where it ferments and becomes of a cheesy consistency with an odor that is more than cheesy, but this mass, after baking under hot stones for a time, is said to yield an agreeable and nutritious food. It is certainly nutritious, for when fresh it contains 14 per cent. of starch and 3 per cent. of protein, and this is high for fruit. As to its agreeable character, one writer says the carefully cooked fresh breadfruit has a taste

only to be compared to that of boiled potatoes and sweet milk, while another says, "With meat and gravy it is a vegetable superior to anything I know either in temperate or tropical countries." The simplest way of cooking the fruit, which is gathered just before it is ripe, is to bake it in the hot coals. Then the soft interior can be easily scraped out.

The excellent quality and bountiful yield of this fruit may have appealed to Byron when he wrote:

The bread-tree which without the plow share yields
The unreaped harvest of unfurrow'd fields,
And bakes its unadulterated loaves
Without a furnace in unpurchased groves,
And flings off famine from its fertile breast,
A priceless market for the gathering guest.

Captain Dampier and later Captain Cook called attention to this wonderful food product, and it immediately appealed to some of the more adventurous as a fruit that would furnish cheap food to the inhabitants of other tropical countries. A ship, the *Bounty*, so famous in history, was sent to Tahiti to get some plants and transplant them in the West Indies, but after the plants had been gathered and loaded on the return voyage, the crew mutinied, turned the captain adrift in a small boat, and went off on an expedition of their own. The captain ultimately reached land but declined to give up the task assigned to him, and courageously set forth on a second voyage in 1792, and actually transplanted several hundred breadfruit-trees to the West Indies. They did not, however, seem to become acclimated, and their culture there has never been a success.

There is apparently no demand in the United States for dried breadfruit, and until it can be grown in some of our few semi-tropical sections there is little chance of its here becoming of importance as a food product,

CHAPTER XI

FILLING THE COFFEE-CUP FROM BRAZIL

THAT wonderful laboratory we call the plant kingdom has furnished to man not only his food but his medicines and his stimulants. Here and there, in this country and that, usually by accident, one of these stimulating principles, which the unpretentious plant has synthesized without any fuss or publicity, has been discovered and utilized by man. No doubt there are hundreds of useful vegetable products that have never been utilized, but the chemist, having learned something about them, has now begun to make them in imitation of nature in his own laboratory. One of these blessings from the hand of nature that man has discovered is coffee. Many marvelous tales of its discovery, most of them entirely imaginative, are told us by the sages of the Orient.

It is flavor, the combined effect on the sense of taste and smell, that induces our adoption of a particular blend or brand of coffee or tea. Certainly no knowledge of the amount of caffein, the stimulating alkaloid, influences our selection, for very few of us care whether or not our coffee has any "kick" in it at all. The amount of tannin, that astringent principle of tea extracted with water, has little bearing on the classification of one tea as good and another

as inferior—it is the flavor that we desire. In tea this aroma is due to the volatile oil and other ingredients developed in curing, and in coffee to the oil developed in roasting. Fine flavor is the thing one, perhaps unconsciously, seeks in making his selection, and this, to a certain extent, is an individual choice for each person. The coffee-blender knows, however, what the public as a whole demands.

We are inclined to think of “Araby the blest” as the original home of coffee, although most authorities agree that from Ethiopia and later from Abyssinia came the first coffee-berries. At any rate,

Coffee, which makes the politician wise,
And see through all things with half-closed eyes,

was the solace of the Asiatics in very early times. It is related among the Arabians that a mollah was told by a goatherd of the exciting effect produced on goats from browsing on the leaves and fruit of the coffee, and he, finding difficulty in keeping the monks awake to pursue their devotions, resolved to try the effect of an infusion of the berries upon them. It was a complete success, and ever afterwards the dervishes were eager to partake of the stimulating beverage. Its use was several times forbidden by the Mohammedans as an intoxicating beverage, but finally in 1554 it was introduced into Constantinople and was used without further opposition by all classes. As the people formed the habit of gathering at the coffee-houses to discuss political and social questions and thus were less faithful in their at-

tendance at the mosque, the authorities for a time laid a heavy tax on the coffee-houses, but this did not decrease their popularity, and it was ultimately conceded that they had "come to stay."

The fame of coffee as a beverage gradually spread to western Europe. Burton in his "Anatomy of Melancholy" written in 1621 referred to it as follows: "The Turks have a dish called coffee, so named from a berry, black as soot and as bitter, which they sip up hot, because they find by experience that that kind of drink so used helpeth digestion, and promoteth alacrity."

The London coffee-houses have been famous since 1640. It is authentically recorded that a certain Daniel Edwards on his return from Smyrna brought some coffee and, very wisely also, a Greek servant who knew how to roast the berries and prepare the beverage. It was a novelty to his guests when the servant, Rossie by name, served coffee to them in real Oriental style, and the house soon became popular with visitors who would taste the new beverage. Edwards then set up his servant in business, and thus the first coffee-house was opened. The venture was profitable even if coffee sold at first for twenty dollars a pound, for it soon became cheaper. In 1657 many coffee-houses were opened, and a tax was paid by these to the English Government.

Shortly these coffee-houses became the center for the gatherings of the intelligent men of the times, the wits, poets, philosophers, and politicians, who came to discuss the news of the day. Here again, as in Turkey, a feeling of antagonism grew up

against these meeting-places, and various attempts were made to repress them. The sale of the beverage was finally regulated by a luxury-tax. If it was not possible to drive out these places of resort, the Government could at least make them a source of revenue.

France was not behind in the early use of coffee. De la Haye in 1644 took the berry and the proper apparatus for preparing the beverage to France.

From Africa the coffee-plant was introduced into western Asia, and finally it became one of the important crops in India and in the island of Java, which has since become one of the important coffee-producing countries, with Borneo and the Philippines.

Into the New World coffee-culture came in a most interesting and almost romantic manner. The magistrate of Amsterdam presented Louis XIV with a fine coffee-tree, and sprouts from this tree growing in the botanical garden were sent to Martinique in 1717, in the care of de Clieux, a French naval officer. On the long voyage fresh water became scarce, and although the other plants died, this officer divided his scanty supply of water with one plant, which he brought safe to land, and it is said that from this have sprung nearly all the varieties grown in the Western world.

A Belgian monk named Molke in 1774 took some coffee-plants from the State of Maranhão, in the north of Brazil, and set them out in the garden of a Capuchin monastery in the suburbs of Rio de Janeiro. Here was started the immense industry that makes Brazil the center of the coffee-industry of the

world. In fact, more coffee is raised there than in all the other countries of the world together, and "Rio" and "Santos" have become almost household words. There are six provinces along the coast that now produce most of the coffee exported.

About 1825 we find coffee was extensively grown in Mexico, and now its cultivation and exportation is an important industry, not only in that country but throughout Central America and the West Indies.

Coffee-trees are set out in rows, carefully cultivated to keep out the weeds, and well manured. A "catch crop," such as rice, tobacco, or Indian-corn, may be grown between the rows. Two to four years after the trees are planted they begin to bear. As soon as the red berries appear picking begins and is continued from one to three months. This is considered a better method than waiting until a large number of berries are ripe and then stripping them off the trees with leaves and twigs—a method sometimes employed.

There is no place in the world where the raising and curing of coffee can be as well studied as in the State of São Paulo, Brazil. In this vicinity there are seven hundred million coffee-trees and three-fourths of the total crop of the world is raised. Here coffee is indeed king. In addition to São Paulo the other important coffee-producing States are Rio de Janeiro, Minas Geraes, and Espiritu Santo, all lying just within the tropics. There are *fazendas* or plantations having three hundred thousand trees, with perhaps fifty trees to the acre. The yield varies

greatly, from one to seven pounds of cleaned coffee to the tree.

It takes three weeks to make the journey to the heart of the Brazilian coffee country from New York, but the trip is largely over the quiet seas of the tropics, where the mild trade-winds blow almost continuously. You enter the port of Rio de Janeiro, then travel eight miles across the country to São Paulo, from which city two hours will bring you into the heart of the coffee country. In all directions around the manor-houses are acres and acres of coffee-trees, their dark green foliage contrasting very beautifully with the red soil. The house is surrounded by groves of palm, banana, orange, and mango-trees. In the immediate vicinity, too, are the brilliant white cabins of the workmen, mostly Italians, and the mills for the curing and sorting of the berry.

The fruit, which nestles among the green leaves, is red, like a small cherry or cranberry. On removing the outer covering, two flat seeds, embedded in a soft, sticky, whitish pulp are to be seen, and closely surrounding these seeds are two coats, the outer something like the husk of wheat, and the inner called the silver skin.

As all these coverings must be removed before the coffee is marketable, these are frequently taken off at the plantation. The plant is usually so arranged on the side of a hill that the berries enter at the top and are carried by streams of water through the different processes to the curing-grounds.

After washing and cleaning and floating off the dry berries, the rest are softened by soaking in ce-

ment-lined tanks, and then carried to the pulping-machine where the soft berries are passed over rollers provided with projections between which and a rough surface the berries are rubbed. The pulp and berries then go to a *reductor*, which is a cylinder running on an inclined axis and provided with holes large enough to allow the good berries to pass through, while the pulp and unpulped berries go out at the end into another tank where they undergo further fermentation.

The cleaned berries are then carried by the water stream to the drying-grounds. Here are various compartments, made of brick and concrete and thoroughly under-drained. Great skill is required in shoveling the piles of coffee from one compartment to another and making the piles thinner or thicker, so that the berries shall dry evenly and thoroughly. If the operation is carried on too slowly or too rapidly, the flavor of the coffee is ruined and the quality and color are spoiled. The wind, air, and sunshine dry the coffee completely, usually in a single day, but the berries are gathered into heaps at night and protected with a cover if necessary. There is little drying with artificial heat in Brazil. The drying and curing process completely separates the coffee-berries from all accompanying substances, and dries it sufficiently so that it will keep in any climate awaiting the final development of the aroma by the process of roasting.

Before the berries are ready to be packed in bags for shipment, one other process remains. The two inner coats must be removed by passing through a

“hulling” machine, which by an ingenious arrangement rubs them off by friction, after which they can be separated from the berries by a fan-mill.

In the pile of coffee are large berries and small ones, and to separate these the *catador* is used. This consists of a rotating cylinder slightly inclined from a horizontal axis, and having its surface punched full of holes of different sizes. The small berries drop through the first series of holes, the larger through the next series, and so on, each size being delivered into its appropriate bin. A still further classification is made by subjecting each size of grains to an upward current of air to separate the light berries from the heavy.

The coffee is packed into stout bags, 132 pounds in each sack, carted to the railroad, thence it goes by train to São Paulo, and finally, still by rail, down the rugged slopes of the Serra do Mar Mountains to the port of Santos. Here are moored at the wharves, which are two or three miles long, vessels floating the flags of every nation. It is truly a polyglot of laborers that stow away the cargo in those vessels for their voyage, perhaps half way around the world.

Although the Brazilian coffee plantation has been described because so much of our coffee, under a variety of names, comes from that country, yet other lands furnish their contributions to the “coffee and spice-mill” of our merchants. From Africa, the original home of the berry, comes the Liberian coffee, a small “pea” berry, which makes a very strong infusion, used generally in Europe for mixing with chicory to produce a cheap ground coffee. The

island of Madagascar furnishes some coffee, and the Bourbon and Mauritius coffees are, sad to relate, often shipped to Aden, on the Arabian coast and packed as genuine Aden Mocha. Only five to six thousand tons of coffee are shipped from eastern Africa, including the Egyptian plantations.

The far famed Mocha coffee is not at present shipped from this region, nor even grown in the vicinity, but a long time ago Aden was the port of shipment for African coffee. The finest Arabian coffee is now grown in the high mountainous province of Yemen, at an elevation of about five thousand feet. This coffee is despatched by caravans from these interior plantations to the ports of Aden and Hodeida. To the coffee devotee who "never used anything but a Mocha-Java blend" it may be discouraging to learn that in the words of an expert: "Before reaching the harbor of Aden, from which port the coffee intended for the aristocracy of Alexandria and Constantinople is chiefly shipped, the beans are sifted and resifted en route, the best being retained by the natives for their own use, the less generous, flattened, opaque, and whitish beans alone reaching their destination."

Substitution is frequently resorted to in the storehouses of Aden and the other points from which it is forwarded, until Mocha coffee intended for the European or American market is no more the real offspring of the Yemen plant than the logwood preparations of a fourth-class wine-shop resemble the pure libation of an Oporto vineyard.

Arabian or Mocha coffee is put up in large grass-

mat bales of distinctive shape and material. Although it is difficult to arrive at the exact amount exported, it is probably not more than eight or ten million pounds annually, and only about half of this is pure Mocha.

With the fragrant Mocha is often associated in our minds the mild Java, for the coffee from this island of the East has won a well-deserved reputation all over the world. It was introduced by the Dutch at the close of the seventeenth century, and has been held by them as a monopoly. In many districts until recently each native family was obliged to care for, say, a thousand coffee-plants and to deliver the commercially cured berries at the "godowns" or warehouses of the government, where the natives received whatever price the officials saw fit to pay. In some instances so much land was set aside by the government for the coffee plantations that there was not enough arable land left for the cultivation of food, so that the natives suffered from famine.

The methods of cultivation and of preparation for market are different in Java and surrounding islands from those already described as followed in South America. Coffee picking lasts nearly the whole year. The newly gathered coffee is carried to a drying-shed, where it is placed on hurdles about four feet from the floor, under which a slow wood fire is kept burning at night, and the indirect heat of the sun is utilized by day. The sea-green or grayish berries are supposed to acquire a peculiar flavor from the wood-smoke.



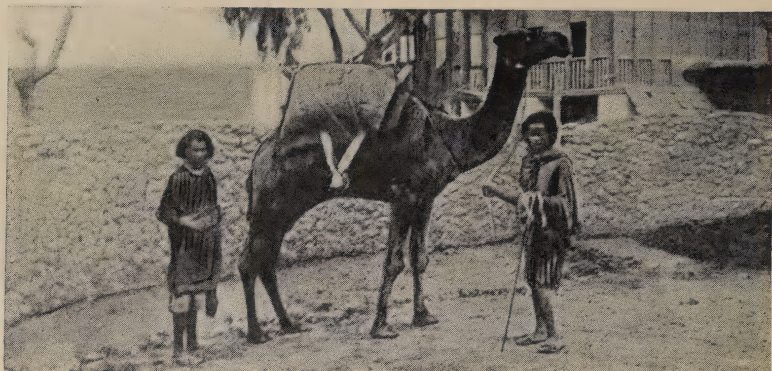
Courtesy Pan-American Union

COFFEE PLANT



Courtesy Pan-American Union

HARVESTING COFFEE IN PORTO RICO

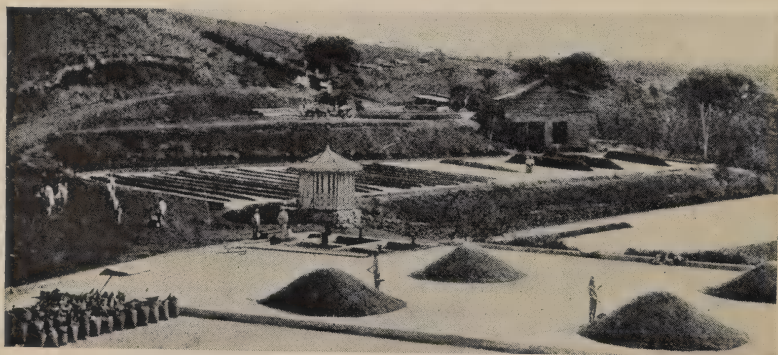


TRANSPORTING COFFEE IN ARABIA



Courtesy World's Commercial Products

DRYING COFFEE IN NICARAGUA



Courtesy Pan-American Union

CURING COFFEE IN COSTA RICA

To "pulp" the coffee, the dried berries are carefully pounded in a bag of buffalo-hide, then cleaned from the husks and packed in bags or baskets to be sent on the backs of buffaloes or mules to the main collecting centers and finally by boats or in carts to Batavia, the chief city of export.

"Old Government Java" was a term applied to a product raised directly under the supervision of the Dutch Government and stored in the "go-downs" for a period of years, frequently as many as seven, so that the berries should become mellow and richer in flavor by the development of the volatile or essential-oils contained in them. Coffee loses as much as 15 per cent. in weight in three years' storage, but at the same time improves in quality and value. More recently, however, the term "Old Government Java" has come to be applied to all Java coffee of a brown color, irrespective of age, so that it has little meaning at present.

An interesting variety of coffee, known as Loeke or "tiger-cat" Java, is prepared by a peculiar process. In that country a small tiger often climbs the trees and appropriates the finest and soundest of the coffee-berries. He is able to digest only the pulp and skins surrounding the seed proper, but the beans are undigested and, being left in the jungle, are picked up by the natives. They are whitish in color, very aromatic in flavor, and are said, by those who know coffee, to be "not excelled by any coffee grown or known to commerce."

Other coffees, as the Sumatra and Celebes, grown on neighboring islands also cultivated by the Dutch,

sometimes find their way into our markets. Cuba, although formerly a coffee-exporting country, is now given over more especially to the culture of sugar and tobacco; other West India islands do not produce large quantities for export.

In discussing coffee on the Western hemisphere, it was said that Brazil is the great coffee-producing country, but why do we go so far away to get our morning beverage? Just across the Rio Grande from us lies Mexico, and there is no country better adapted to the growth of this berry, yet in 1914 Mexico furnished only one-twentieth of the amount of coffee imported. The same causes that have for a hundred years retarded its agricultural and commercial development have prevented its taking first rank as a coffee-producing country.

The Guatemalan coffees are among the finest grown. Production of coffee has doubled there within the last ten years, and as the price has increased very rapidly there is a dangerous temptation to speculate on the land value of the plantations. As all these tropical and sub-tropical countries can raise coffee, we sometimes have on the market the beans from Venezuela, Costa Rica, Salvador, Colombia, and Ecuador.

In order to bring out the flavor of coffee it is necessary to roast it, and this was at first done on a small scale in every household, but at the present time it is done on a large scale by the coffee-roasters and wholesale grocers. In the latter case, much skill is necessary to heat the charge in the revolving cylinders to the right temperature, neither too rapidly

nor too slowly, and the coffee must be cooled quickly. The berry not only loses from 12 to 16 per cent. in weight by this operation but it increases in bulk often over 50 per cent. The loss in weight is due to the volatilization of water, fat, caffein, and other organic materials, and a substance called *caffeol*, to which much of the flavor is due, is at the same time developed. So much caffein is driven off in the operation of roasting that in the large establishments the flue-dust is saved and after purification yields considerable of this valuable alkaloid. This is used as one of the ingredients of numerous fancifully named soft drinks.

It would be strange if a beverage used all over the world were not made in different countries in a variety of ways, the object always being to get the greatest strength and aroma from the berry, without extracting any of the astringent properties, and to make a clear, rich, brown liquid free from grounds. This may be done by infusion or "drawing" as we generally prepare tea, by boiling for a few minutes, or by filtration or percolation. Turks, who are famed as coffee-drinkers, grind the bean very fine, put on cold water, heat to boiling, and serve "black" without settling from the grounds.

In Egypt, also a coffee-drinking country, they prepare the coffee as do the Turks, by adding an equal amount of sugar, pouring on boiling water, and then allowing it partially to cool, heating again several times, until the beverage becomes black, thick, and very strong. In Cuba the coffee is moistened and placed in a coarse flannel bag, which is suspended

from a nail over the coffee-pot. Cold water is poured on the bag and the drippings are again and again poured over the coffee. This decoction, added to a cup of boiling milk, is said to yield a beverage "fit for the gods." Many people believe that coffee made with cold water is stronger and better than if made with hot water, and there is certainly less danger that the tannin of the coffee will be extracted.

In South Africa the natives mix the finely ground coffee with grease, make it into balls and eat it. The word beverage would hardly apply here. The Arabs mix the coffee with a little salt, heat it in an earthenware vessel, pour on boiling water, and allow to stand on the hot ashes until it settles.

Coffee is a luxury, or, we might better say, a necessity of the nineteenth century, for it is only in these later years that the use of the beverage has become so universal. The quantity consumed was nearly doubled between 1855 and 1885, and again since that time, with a constantly increasing use.

Trade conditions have not yet become normal since the War, but in 1914 we imported from

Brazil	753,113,500 pounds
Colombia	91,830,513 pounds
Venezuela	49,953,478 pounds
Mexico	49,385,504 pounds
Guatemala	25,009,202 pounds
Salvador	8,758,603 pounds
Dutch East Indies	8,421,592 pounds
Aden, Arabia	2,271,202 pounds

and smaller quantities from other countries. The total imports of coffee were 1,001,528,318 pounds. That there was in 1919 a substantial increase in the use of coffee is shown by the fact that there were 1,333,000,000 pounds, worth \$261,000,000, imported. Imports for 1921 were 1,340,979,776 pounds. This is the highest record ever made both in quantity and in value. Brazil, Colombia, and Venezuela are still the leaders in shipping to the United States.

We take the lead among the coffee-drinkers of the world, our consumption in 1921 being 12.3 pounds per capita.

CHAPTER XII

LIVING WITH OUR LATIN-AMERICAN NEIGHBORS

FOR many of our most popular food products we must depend on the land near the equator. It should not be forgotten that the New World possesses only a small and thinly settled tropical area compared with the Old. In this hemisphere we have an area of approximately 6,361,000 square miles in the torrid zone, with only fifty-seven million people. The number of inhabitants is important, as upon them we must depend for the cultivation of the fruits and vegetables for export to the more temperate climates. In the Old-World tropics there are some 21,000,000 square miles and half the population of the globe, say, 800,000,000 people. Only Porto Rico and the Canal Zone in the equatorial area are directly under the Government of the United States. Great Britain and even France have larger tropical colonial possessions. We have, of course, something of a hold on Hawaii and the Philippines but they are on the other side of the globe. Although we boast of southern California, Arizona, New Mexico, and Florida, these regions are only sub-tropical and, unfortunately, subject to occasional frosts.

The resources of eastern Mexico, of the Central American states, and of the South American countries that touch the waters of the Caribbean Sea are

just beginning to be developed. All this is north of the equator, much of it as warm as the African country bordering on the Mediterranean Sea, and well watered and capable of greatly increased production. Their present low production is due largely to the fact that we have not had the commerce with these peoples we should have had, transportation has been inadequate, and our policy with the Latin-American states has been vacillating. Further south are the torrid portions of Brazil, and some of the Pacific states, which might readily ship far greater quantities of tropical products to our western ports than we have so far asked them to furnish us.

TAPIOCA, CASSAVA, MANIHOT-

The first of the Latin-American products to attract our attention is tapioca. The word "tapioca" to most of us brings a picture of the boarding-house dessert familiarly referred to by the college boy as "fish-eye pudden." Cassava and manihot are but names, unknown to the average American tongue. In Brazil, where this root first came into use as a food, not a trimming, a native would be at a loss for his mid-day meal without it. All over the tropics it is used not only for human food but as feed for stock and for the manufacture of starch. Just as the potato, which originated in Peru, became the staple as a starchy tuber for all temperate latitudes, so the cassava—also from South America—supplies the tropical countries in both the Old and New Worlds with a wholesome farinaceous food.

The cassava-plant belongs to the milkweed family

and grows wild in two forms, the "bitter" and the "sweet." The cultivated varieties are probably derived from both kinds. The plant is a bushy shrub less than ten feet high, with long deeply divided leaves, and is propagated by cuttings or canes which are preserved by being bedded in the earth during the winter for setting out in the spring. The plant grows rather slowly, so that it does not usually pay to dig the roots until they are two years old. The cluster of roots will then weigh from five to thirty pounds, although the ordinary weight is not over ten pounds. A field of cassava, with its large branching stems and spreading clusters of greenish purple flowers, presents a beautiful and truly tropical appearance.

There is another analogy between the potato and the cassava; the potato belongs to the nightshade family, and several of the plants of this family, as, for instance, the "deadly nightshade," are extremely poisonous. Both the sweet and bitter cassava-roots contain an extremely poisonous substance, prussic or hydrocyanic acid, but there is not enough found in the roots of the sweet cassava to be dangerous. This is the poison that gives the deadly quality to "bitter almonds," and which is found in peach-pits in sufficient quantity to cause serious symptoms if a considerable quantity of them be eaten. In the process of preparation of the starch or of tapioca from the cassava-roots, however, the poison is eliminated. It is only necessary to heat the pulp or the starch to drive off the poison, which is readily volatile. To make commercial tapioca the



Courtesy U. S. Department of Agriculture

SUGAR APPLES



Courtesy U. S. Department of Agriculture

WHITE SAPOTI



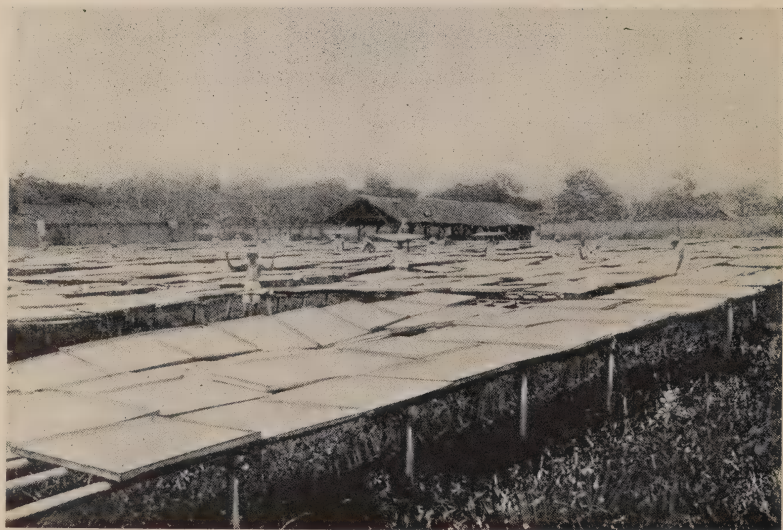
Courtesy Netherland Indian Government

FIELD OF CASSAVA



Courtesy U. S. Department of Agriculture

NATIVES POUNDING CASSAVA



Courtesy Netherland Indian Government

DRYING CASSAVA

roots are ground with water and the cellulose, or woody portion, removed by straining the milky liquid through a cloth. This fluid is then allowed to stand in shallow pans until the starch is deposited. The clear liquid is drawn off and thrown away, and the moist starch is heated until the mass is agglutinated and the prussic acid driven off. Pearl-tapioca, flake-tapioca, minute-tapioca, or tapioca-flour can then be made from the prepared starch by appropriate treatment.

The preparation of cassava "among the Indians of Guiana" is thus described by a well-known author: "The women squat on the ground and peel off the outer rind of the root with a large knife. The roots are then mashed and rasped into pulp by being vigorously drawn up and down over a board studded with small pieces of stone. This is really a crude grater. The pulp is then put into a long cylindrical bag which hangs from the roof of the native hut. Sometimes a weight is hung from the lower end of this bag to help squeeze out the juice, or perhaps a lever is attached to the bottom of the bag, and the woman sits on the end of this to express the juice. Most of the prussic acid is thus carried away in the juice, and the rest of it is driven off in the process of cooking. The contents of the bag are dried, and used for making bread and cakes."

Is the juice wasted? Not for a moment. It contains an agreeable flavor, and is therefore boiled until it is as thick as soup, and under the name of "cassareep" forms the basis of one of the best Indian dishes, pepper-pot, and of the well-known

Worcestershire sauce. In Liberia and other parts of Africa, what might be called the national dish is "dumboy," prepared by the natives from the boiled cassava-roots, beaten in a wooden mortar with a heavy pestle. This is eaten in a soup with meat and with other vegetables. In Sierra Leone, an entirely different dish, yet one of just as much importance as a staple food, called *fou-fou*, is prepared from these roots. In some countries manihot-flour is a substitute for wheat-flour for bread-making. Under the name of "cassava-meal" South American natives have almost from the earliest times made this food their great staple carbohydrate. They pulp the root, express the juice, and after making the residue into thin cakes, cook and store them. This product is like our hard-tack, which will keep in any climate. As thus prepared the cassava has a nutty flavor and is highly palatable and nutritious. In Brazil also so extensively are cassava products used by the natives that cassava can almost be styled the most important common food.

As a feed for cattle and hogs, thus taking the place of grain, cassava has been found very satisfactory. Attempts at growing cassava in the United States, especially in Florida, were made more than fifty years ago. By careful experimentation it has been found that there is a cassava zone, as it might be called, that is, a narrow range of climate where the roots can be successfully grown. This zone includes all of Florida and the southern parts of nearly all of the other Gulf States. It is probable that south-

ern Arizona and California also afford favorable climatic conditions.

Centuries ago the South American Indians experimented with this root, which they found growing wild in the forests, and perhaps before they discovered that the raw cassava was poisonous many fatalities occurred; but having profited by their experience, all tropical lands have now at their disposal a readily grown root-crop that yields abundantly and furnishes a cheap starchy food. What an economic loss would have occurred if the earlier experimenters had not persevered until they learned how they could prepare this valuable root so that it could be used as food material!

SAGO

Travelers in California or in the Southern States have noticed a palm with a very sturdy stem and a gracefully spreading bunch of sharply pointed grassy-green leaves terminating the trunk. This is the sago-palm, which in the United States grows very slowly but in the East Indian archipelago, the original home of the tree, in Ceylon, China, Japan, Siam, and the West Indies, where the climate is hot and the soil rich and full of moisture, grows rapidly.

Compared with other tropical plants, however, its growth seems slow for it does not attain maturity until it is about fifteen years old. It is then twenty-five or thirty feet high, and as the buds appear a wonderful change takes place; the trunk is found to be packed from root to crown with a starchy material. The spines that appear on the trunk of the

young palm, seemingly to protect this rich storehouse of starch from marauding animals, are eliminated as the tree gets older and the woody fiber outside of the trunk grows to protect the interior. If the tree is allowed to blossom and bear fruit, the starch is all absorbed and utilized in this process of nature, and the tree soon afterward dies. The natives do not allow this to take place, however, but just as the tree reaches the maximum of its starch-content, it is chopped down, cut up into convenient lengths, and these sections split so that the crude starch can be scraped out with rasps or graters. This is then kneaded with water and strained to remove the woody fiber. The milky liquid with the starch in suspension is allowed to settle, the clear liquor drained off, and the sago-starch or flour dried for use.

The moist starch may be mixed with a little water and granulated by being passed through a sieve, and afterwards heated to give us the "pearl" or "bullet" sago found on the market. As one of these "starch-logs" will yield from five hundred to seven hundred pounds of sago, it is evident that enough of this starchy food to support a large population may be raised on a single acre of ground, and no labor is required except preparing the starch from the matured palms. It is no wonder that the sago (from *sager*, signifying bread, in the Papuan language) is so popular, for it is the actual "staff of life," the chief and often the only food of many Polynesian tribes. For 1921 imports of sago, tapioca, and other farinaceous substances amounted to 54,612,204 pounds.

ARROWROOT

There is another starchy food found growing in the West Indies, Guiana, Brazil, and in fact in nearly all tropical countries known as arrowroot. We have been told that the name comes from the peculiar sagittate character of the rhizome or rootstock, but others say that it was given this name because the natives made a poultice from the root for the treatment of arrow poison.

Arrowroot-flour is prepared from the root in the same way that tapioca is made. It is held to be particularly valuable for invalids on account of its ready digestibility. Arrowroot-flour is also an important food for the natives of tropical countries.

THE AVOCADO

In the market places of Mexico, the West Indies, and the Central and South American states, one of the most abundant fruits is the avocado or alligator-pear. In these countries the fruits are sold for half a cent apiece, or thirty to forty cents a bushel, and their rapid sale gives one an idea of how generally they are used among the natives. As they are available many months in the year and are so very cheap, it is possible for the poorest of the natives in the principal avocado regions to use them as a part of their daily fare for fully half the year.

The avocado, which originated in Mexico, Guatemala, or South America, grows on a tree from thirty to sixty feet in height. It belongs to the laurel family, as its thick heavy green leaves and their spicy

odor and taste would indicate. Its cultivation spread slowly from the New World to the Old, but in recent times it has been grown in nearly all countries where the climate was suitable. Among these may be mentioned India, where it has been cultivated since 1860, the South Sea Islands, and the countries bordering on the Mediterranean Sea. The fruit, which has sometimes a rough and sometimes a smooth skin, is pear-shaped, from six to eight inches long, and although there are occasionally large varieties, the ordinary weight is from one-half pound to two pounds. The color varies from a dark green to a deep purple.

In the Guatemala region, where large areas have been cleared to start banana plantations, there are many scattered avocado-trees, but they are not planted in regular orchards as we understand it. In fact, the avocado may be called a "door-yard" tree, for while the banana and the coffee are grown mainly for export, the natives depend largely for their food at certain seasons of the year upon this fruit. In the Central American countries, where the soil is rich and the climate mild, at an elevation of from twenty-five hundred to seventy-five hundred feet, the alligator-pear flourishes.

There are numerous varieties differing greatly in quality and productiveness. Three varieties known as the Guatemalan, Mexican, and West Indian are generally recognized by investigators. The fruit known as the *coyo*, while closely resembling the avocado, is really of another species of *Persea* and by some considered superior to the avocado.

Avocado trees are readily propagated from seed but their seedlings are never reliable as to quality and productiveness, so that they are budded to insure good varieties and about a year later transplanted. No less than twenty-three different varieties of avocados have been introduced for trial into California and Florida.

This fruit was introduced into California at Santa Barbara in 1870, and since that time many orchards of from five to ten acres have been planted. The Guatemalan type has been found to be the most hardy, as it blossoms so late in the spring that there is little danger of frost. The fruit can be held in cold-storage at thirty-two to thirty-five degrees Fahrenheit for at least two months. The avocados now on our markets come from California, Florida, and the West Indies. What are the best varieties to grow for shipping, and under what conditions they will best bear transportation are questions that are still not fully settled. The time will come, however, when this fruit will be in such demand that it will appear in abundance in all our large markets.

The avocado may properly be described as "the salad fruit," for it has the unique position of being almost the only one which when ripe is generally eaten as a salad. A taste must be cultivated for it; but that should be no hardship to the people of the United States who have already developed a liking for green olives, bananas, tomatoes, and other fruits which they once neglected or positively disliked. We seldom accept new foods on first trial, even though recommended by our friends, but a little persistence

in tasting will usually bring to us a fondness for them. Some have said that these acquired or carefully nursed and encouraged tastes finally become stronger than those which have been with us from infancy. That the taste for the avocado, when once acquired, becomes almost a craving is shown by the extravagant prices paid for it in the Northern markets. When we say that "an avocado, four or five tortillas (small round cakes of coarsely-ground maize), and a cup of coffee are considered by many Indians the constituents of a good meal," it is evident there must be some reason for the high position the avocado has reached as a food product. This is found in the large amount of fat that the fruit contains. In fact it is essentially a vegetable butter, comparable with the olive in this particular. The edible part of the olive contains on the average about 24 per cent. of oil, while that of the avocado 12 per cent. Or if we compare energy values, which for most fruits is low, we find that of the avocado to be more than twice the maximum value of most other fruits.

Says Dr. M. E. Jaffa in discussing the food value of the avocado:

The dietetic value of fruit, aside from the actual nutrients which it contains, lies in its succulency—its minerals and organic acids. If gaged by its nutritive value alone, fruit would seem to be an expensive form of nourishment, but when its hygienic qualities are considered its money-value to the consumer is difficult to estimate. Some fruits carry more nourishment with their hygienic properties than others. Some contain minerals which are more valuable to the system or less commonly distributed than others. Therefore while there are general properties which are common

to all fruits, each has special properties which justify individual consideration.

Judging from its composition, the avocado should perhaps prove to have laxative qualities of a peculiar or individual type, possessing as it does the combination of the usual "fruit principles" and that of fat or oil. The laxative properties of most fruits depend upon the stimulating effects of the fiber upon the wall of the intestine and partly upon the organic acids and minerals. Oil has a tendency to soothe and to lubricate the intestine even while it acts as a mild laxative. The avocado is a natural combination of these two types of foods—as if fruit and olive-oil had been chemically combined by nature. Whether or not there is any special advantage in this natural combination over that made by a proper selection of foods remains to be proved.

In those countries where the avocado is abundant the natives merely break the fruit in halves, sprinkle a little salt on it, and eat it with great relish. They scoop out the soft pulp from the skin with a bit of tortilla or, more commonly, with their fingers. It is said that among those accustomed to European cooking this fruit is commonly added to meat-soups at the time of serving. A better method, perhaps, is to place a ripe avocado before each guest, who is then at liberty to open the fruit, and after removing it from the skin to place it in his soup. It adds a decidedly pleasant flavor to the food.

There is a salad called *guacamol* which is made from the mashed avocado-pulp, vinegar, salt, pepper, and finally chopped onions, that is in great demand among the natives. Because this fruit contains so much oil, soap is made from it by mixing it with some alkali. This has a reputation for stimulating the growth of hair on the scalp. Numerous are the

other uses for the avocado, and they are very diverse. A product that is a "good diet for caged song-birds to make them sing, is excellent food for hens to make them lay, is one of the best foods for hogs, and as a medicine will cure a cold in the head," is certainly a good thing to have in the family.

TUNA (PRICKLY-PEAR)

One of the common plants of the sub-tropical wastes of the Southwest, of Mexico, and Central America, as well as parts of Italy and Sicily, is the variety of cactus known as the prickly-pear. It is the Indian fig of the English writer, the Barbary fig of the Frenchman, the *higos chumbros* of the Spaniard, and the tuna of the Mexican peons. This variety of names is testimony to the wide distribution of the fruit.

The spiny stems of the cactus are always associated in our minds with sand and rocks and rattlesnakes. Like rattlesnakes, cactus-stems can stand a long period of drought, for they have thick skins with few pores through which water can evaporate. In fact, cactus-stems store the water against future needs.

The Aztecs, when they started on their pilgrimage to seek a land of peace and plenty, were told by their wise men to build their city where they would find an eagle, a snake, and a cactus. When in 1312 they reached the plateau of Santo Domingo, where the City of Mexico now stands, and saw that which they were seeking, they settled, and thus we have the coat of arms of Mexico—an eagle, a snake, and a cactus.

A cheering touch of color in a parched land is the yellow or purple flower of the prickly-pear, followed by the pear-shaped reddish fruit. Its pulp is juicy with a rich acid taste suggesting cucumbers. As it contains 11 per cent. of sugar, it compares favorably in nutritive qualities with fresh figs, oranges, or cherries. It is prized for its cooling qualities, which make it doubly welcome in a hot, dry climate. Although covered with tough, prickly rind, this is readily removed by one accustomed to eating the pear.

We may some day find prickly-pears abundant in our home markets, for they bear transportation fairly well. The fruit from northern Africa and other Mediterranean countries already finds its way into the celebrated Covent Garden market of London.

Since this fruit is abundant in Mexico, it is used to make a thick syrup called "tuna-honey," or the juice, if still further concentrated, gives sugar products which crystallize on standing. The Mexicans have also learned that all sweet fruit-juices like that of the tuna ferment on standing. They call the "present use" beer made from the tuna *colonche*.

THE MANGO

It is a little difficult to tell just where the mango should be classified, for although it originated in southern Asia it flourishes in all tropical climates and is very popular with our Latin-American neighbors. The fruit grows on a beautiful tree, with wide spreading branches and glossy leaves, which is held sacred by the people of India. The fruit is as large

as an orange, but more oval in shape, red to yellow in color, and contains a yellowish-red, somewhat slippery pulp.

“Travelers in the tropics record mingled emotions in their experience with mango,” says Charles M. Skinner; “the exceeding juiciness thereof suggests that it be eaten in overalls, and which, when all is said, tastes to most of us like a door-mat soaked in turpentine. The tree is, however, prized by the Canarese, who have a legend that it is the ‘Tree of Life.’ ”

The range of climate where the mango can be grown is wide, so that fruit from Florida and southern California is becoming common in the markets of the large cities. From the green and strongly acid fruit the natives of India make mango chutney, a relish that is much appreciated in Europe and America.

OTHER TROPICAL FRUITS

Probably most of us know very little about many of the numerous fruits which contribute so much to the life and comfort of these people in South and Central America. We never see them, and they never find their way into our markets, but we hope to utilize many of them some day.

One of these, the white sapote (see cut), has a delicate but extremely bitter after-taste. We have become accustomed to those sour-bitter flavors, since we learned to eat grapefruit. The texture is smooth and custard-like, and the people of the North become extremely enthusiastic over it. Experiments made

thus far indicate that the sapote may be grown in Florida and southern California.

The chayote (see cut) is another of the exotic vegetables or fruits and is grown on a vine which in itself is very decorative. The fruit weighs about a pound and is a great favorite in South America, the West Indies, and the island of Madeira.

In a Brazilian market we come across a very interesting fruit, which, as there are many varieties, is known locally by many names as the cherimoya, sour-sop, custard-apple, alligator-apple, and sugar-apple. The cut shows the fruit as grown in Bahia, in southern Brazil. It occurs in creamy flakes, which seem to separate into segments. When eaten it melts in the mouth and carries the flavor both of the pineapple and the banana. Some varieties have a flavor suggesting clotted cream with sugar, and the odor of rose-water. Many of these fruits if cultivated and improved by modern methods, as have been so many of our more common fruits, would no doubt yield delicious products.

The fruit of the jaboticaba-tree which grows in Brazil is much prized. This which is in large clusters on the trunk, frequently grows within a few inches of the ground. The fruit is not at all a grape, although the skin is tough and the pulp is squeezed out when eaten. The seeds, being rather large, are usually discarded. The fruit has a sub-acid flavor and, like so many of these Southern products, is not as a rule relished at first but when the taste for it is acquired it becomes a great favorite.

Just one more of these fruits should be mentioned, the pejibaye of Costa Rica. It grows on a species of palm, a single tree often producing 150 pounds of fruit. We do not wonder that it is popular when we learn that it is extremely nutritious, containing about 40 per cent. of carbohydrates.

VANILLA

Just a flavor! And yet vanilla-beans to the value of \$1,750,897 were imported from all sources in 1921 into the United States. To the rough bark of a tree, by aërial rootlets, this peculiar orchid attaches itself. It is almost the only one of the hundreds of orchids that has an economic value; others are prized for their brilliant flowers and their fantastic shapes. Trees are generally used as supports for the plants, both because they are the most readily available trellises to use for this purpose, and the vines thrive best in the shade.

It seems to be generally conceded that southeastern Mexico or Central America is the original home of the vanilla; at any rate it was used by the Aztecs for flavoring chocolate, long before the advent of the white man. To taste it is to desire it, just as is the case with the chocolate with which its flavor so deliciously blends. So popular is this flavor that three times as much vanilla is consumed as of any other extract. In Mexico more than 50,000 people are employed in the cultivation and extraction of vanilla.

This plant was first described by a Mexican Franciscan friar, by the name of Bernhardino de Sahagan in 1575, and even though the bean has been grown

successfully in other tropical countries the Mexican product is still regarded as having the finest flavor.

One would not expect the growing of such a valuable flavoring material to be long confined to the country of its origin. In the eastern hemisphere the best success in growing the plant has been attained on the tropical islands of Oceanica, especially in Java, Réunion, Mauritius, Tahiti, and in the group known as the Seychelles lying northeast of Madagascar.

The particular article of commerce listed as vanilla is a pod about eight or ten inches long and half an inch in diameter. Although called the vanilla-bean, it is not in any sense a bean except in that it grows like a bean-pod. An interesting fact concerning the cultivation of this fruit is that the female flower must be pollenized by hand to secure a satisfactory yield. The pollen of the male flower is removed by the use of a small splinter and deposited on the female flowers. As the flowers are something like our noon-sleep in their habits, this work must be done in the early morning before the flowers are closed. The pods mature six or seven months after flowering, and great skill and experience are required in picking them at just the right time.

The ripened pods contain minute black seeds embedded in a yellow granular balsam, and strange to relate, the beans at this stage have no agreeable odor or flavor. As is the case with tea and coffee and chocolate, the odor and flavor are brought out by curing. The beans are subjected to a process of sweating and fermentation, being alternately ex-

posed in the sunshine, or sometimes by artificial heat, and then stored wrapped in blankets. The quality of the beans depends very largely upon the care used in this process of curing. In different countries the process is carried on differently. In the French colony of Réunion the beans are plunged into a bath of hot water as soon as they are picked. In this operation they are wilted, and it is claimed that the fermentation and subsequent curing are aided.

There is no more interesting sight, to one who is versed in "foods and flavors," than an immense pile of bundles of vanilla-beans with their soft, brown, silky pods covered, as they often are, with minute white crystals of vanillin, the active principle. Then when the price of eight to nine dollars a pound is mentioned, one becomes still more interested.

The chemist has ascertained that the crystals of vanillin consist of the aldehyde of methyl-*proto-catechuic* acid. With this information he has worked out a method of making vanillin synthetically or artificially in the laboratory from oil of cloves, eugenol, or other substances. The effect of this discovery was at first to decrease the demand for vanilla-beans and consequently to lower the price. With the decreased price, however, the use of the beans gradually increased until more than a million pounds were imported in 1920. Imports for 1921 were 984,374 pounds. Although for many purposes artificial vanillin is a substitute for the genuine extract of the vanilla-bean, a more delicate flavor is obtained in the natural extract. This is perhaps due to secondary aromatic flavoring compounds or resins which accom-



Courtesy Pan-American Union

DRYING VANILLA BEANS



Courtesy Pan-American Union

PRIMITIVE MILL FOR PULVERIZING CORN OR CAPSICUM



Courtesy U. S. Department of Agriculture
PICKING AVOCADOS, MEXICO



Courtesy U. S. Department of Agriculture
GUATEMALAN CHAYOTES



Courtesy U. S. Department of Agriculture
TONKA-BEANS

pany the vanillin in the beans. The flavor is such a delicate substance that an almost unweighable quantity will impart to a food a distinct taste. The beans contain from 1 to 3 per cent. of vanillin, but just as the quality of a tea does not depend on the amount of them contained, so the value of a sample of vanilla is not based on the percentage of vanillin. To obtain the extract, the vanilla-beans are cut in very fine pieces and digested for some time in a mixture of equal parts of grain-alcohol and water.

Many of the extracts on the market are made largely of artificial vanillin, an extract of the tonka-bean (see page 226), which has a flavor not nearly so delicate or agreeable as the vanilla. Synthetic coumarin, a constituent of the tonka-bean, is also frequently used. It is needless to say that none of these take the place of the genuine extract of vanilla, although they are undoubtedly cheaper and thus available to those who can not afford the superior product.

The Department of Agriculture has very recently been making extensive experiments in the growing of the vanilla-plant in Porto Rico, and these seem to indicate that the soil and climate are well adapted to its cultivation. The time may come when all our vanilla is raised in the West India islands and in our own non-contiguous territory.

TONKA OR TONQUA-BEAN

Another tropical flavoring or perfuming material known as the tonka-bean seems to have originated in Guiana, the little-known tract embraced between the

waters of the Orinoco and the northern branches of the Amazon River. It is the seed of a leguminous tree, which grows to the height of eighty feet. The pod contains a single kidney-shaped bean, with an odor suggesting new-mown hay, and so this bean is in great demand by the perfumer for mixing with other perfumes to give permanency, and by the manufacturer of "compound" vanilla-extract. The active principle coumarin which it contains can also be made synthetically by the chemist in his laboratory.

Attempts have been made to grow the tonka-tree in the West Indies, especially in Trinidad, but without very much success, as it comes into bearing only after it is ten years old. At present there seems to be an ample supply from trees growing wild in Venezuela. This is exported, almost exclusively through Ciudad-Bolivar. To prepare the beans for market they are soaked in rum for about twelve hours and then dried in the sun. In this process they become covered with a thin, white, crisp coating and acquire their characteristic odor as well as appearance.

CHAPTER XIII

STIMULANTS AND SEDATIVES IN SOUTHERN LANDS

HOW it happens we do not know, but man, either primitive or civilized, needs, or thinks he needs, some kind of a stimulant, a narcotic, something to soothe the tired nerves or excite the brain. He always gets it. The strange thing about it is that the natives of each country independently have found a leaf, a nut, or a fruit that will produce the desired sensation. They chew the leaf, or make an extract of the plant, or roast the nut or fruit, and lo! they have the desired stimulant or sedative. Then its use becomes the fashion in that country; it is incorporated into social customs and finally nobody can get along without it. No English novel would be complete without at least two score allusions to taking "a cup of tea," we can never dissociate the sensuous Turk from his cup of black coffee, the hardy mountaineer gets new strength for his climb in the heights of the Andes from his gourd of freshly brewed maté, and our Central American neighbors always show their hospitality to their guests by offering them a delicious cup of chocolate.

We sometimes divide these stimulants into two classes, intoxicating and non-intoxicating. The use of the former having brought with its pleasure much of evil in their abuse, thinking people are beginning

to discard them as harmful and to substitute the less injurious non-intoxicating stimulants.

What about the habit-producing drugs? Yes, unfortunately there is a growing list of these, also—drugs which, once introduced into medicine as valuable remedies, in their abuse have wrecked the lives of thousands. We do not pretend that drug-addicts are attracted by the agreeable flavor of opium, cocaine, or hasheesh, but by the knowledge of the agreeable sensations they will temporarily produce. These are drugs, not satisfying beverages like coffee, tea, and chocolate that attract by their flavor and by the mild stimulating effects produced. It is necessary to cultivate a taste even for these, for we find that children must be taught before they enjoy their use.

Perhaps there are no races of people who have discovered more of these stimulating or sedative materials in the vegetable kingdom than our neighbors to the south of us from the Rio Grande to Patagonia. What are some of these interesting substances, which they have found in their native lands?

CACAO-CHOCOLATE

“Theo-broma,” food of the gods—that was the name given by the enthusiastic botanist Linnæus to the cacao or cocoa-tree from which the cocoa and chocolate of commerce are obtained. Long before the use of tea or coffee was known to the Europeans, the Aztecs of Mexico were accustomed to serve at their “afternoon teas” a beverage under the name of *chocolath*, a word meaning choco or cacao-water. At

one time the beans were used as currency and are described by Peter Martyr as "blessed money," because it would exempt its owner from avarice, since it could not long be hoarded nor hidden underground.

According to one of the most sacred traditions of the Indians of Mexico, we are indebted to Divine Providence for the introduction of cacao to earth. Quetzalcoatl, god of the air, was commissioned to convey to man the seeds of *quacahault* (the cacao-tree), which was one of the few growing in the Garden of Eden, for the delectation and food of the gods and the first sons of the sun.

Bancroft, writing of the Maya races of the Pacific, says: "Before planting the seed [of the cacao] they hold a festival in honor of their gods, Ekchauh, Chac, Hobnil, who were their patron deities. To solemnize it, they all went to the plantation of one of their number where they sacrificed a dog, having a spot on its skin of the color of cacao. They burned incense to the idols, after which they gave to each of the officials a branch of the cacao plant."

The Spaniards, those indefatigable navigators of the sixteenth century, were not slow to proclaim the wonders of this beverage to the European countries. One of their number, Fernando Cortez, in 1529, has the honor of first introducing it there. Antonio Cerletti learned the art of preparing chocolate from cocoa-beans and introduced it into Italy in 1606. Fifty years later it was evidently the newest thing in beverages in London, for we read the announcement: "In Bishopsgate Street in Queen's Head Alley, at a Frenchman's house, is an excellent West

India drink called chocolate, to be sold where you may have it ready at any time, and also *unmade* at reasonable rates."

It is evident that it was against considerable opposition that the use of chocolate was introduced into the British Isles, for we read in "The Spectator," under the date of 1712: "I shall also advise my fair readers to be in a particular manner careful how they meddle with romances, chocolate, novels, and the like inflamers, which I look upon as very dangerous to make use of during this carnival [that of the month of May]."

In the Dutch edition of Benzoni's "History of the New World" is an interesting picture and below it the following: "Of the tree which bears *cacavate*, which is money, and used by the Indians to obtain fire from two pieces of wood.—*Cacavate* which is money. The tree which produces it is not very large and grows only in hot places but needs shade or if the sun were to shine on it would die; therefore, they plant them in forests where it is humid and if afraid that that is not enough they plant them near to a tree which is higher and which they bend over. It spreads out its top so that it covers the cacao-tree, which then gets shade all over it so that the sun no longer does any harm. When they want to make a fire they take two pieces of wood from this tree and rub them against each other till they take fire, and so this is the method of making fire by the Indians."

In the time of Cortez, as noted above, cacao-beans were used as a substitute for money. A slave could be bought for one hundred beans. We know that

barter was a common method of trading with the North American Indians. When the monetary system of a country breaks down, some commodity is designated as money. In Russia to-day a "pood" of rye is the medium of exchange—an interesting illustration of reversion to primitive customs!

In Montezuma's palace great stores of cacao-beans were found, and in fact the beans represented a great part of Montezuma's private property. The cacao beverage was always kept ready for his personal use, and was served in golden beakers.

It has been observed that the cacao grows best between twenty degrees north and twenty degrees south of the equator. It requires a deep soil, a mean annual temperature of eighty degrees, and from fifty to one hundred inches of rainfall. J. H. Hart, in discussing cacao-growing, says, "The ideal spot in which to found a cacao plantation is a well-sheltered vale, covered with large trees, protected by mountain spruce from prevailing winds, well watered, and yet well drained, with a good depth of alluvial soil on which rests a thick deposit of decayed vegetable matter."

In the western hemisphere there is more water than land in the area north of the equator, and to the south, especially in Brazil, much of the land has never been cultivated and is thinly settled, so that altogether the area adapted to cacao culture is limited.

Although the southern part of Mexico, probably the original home of the chocolate, is well adapted to its growth, yet in Mexico only enough cacao is at

present raised for home consumption. We must depend for our supply on Santo Domingo, the British West Indies, British West Africa, Brazil, and Ecuador. It is also imported from Thome, an interesting island of four hundred square miles, off the African coast. This is a Portuguese colony and, in proportion to its size, yields an enormous output of cacao. A Spanish colony on Fernando Po, an island near the African coast, the Gold Coast, the Cameroons, and Ceylon also send us cacao-beans. In Ceylon coffee was at one time the chief crop, but this was later replaced by tea, and now the cacao crop has become of considerable commercial importance.

Of crude cocoa 304,817,115 pounds were imported into the United States in 1921. Imports of manufactured cocoa were 1,750,638 pounds.

Cacao-trees may be raised from seed, or they may be started in nurseries and later transplanted to orchards. The banana, and coral-trees and cassavas, are planted between the rows of young trees to shelter them from the intense heat. It is only necessary to wait five years after planting, so rapid is the growth of the tree in this hot moist climate, before the small pink flowers and later the pods, borne directly on the trunk and many branches, appear. Is there any other plant that fruits in such a peculiar position? It has been suggested that perhaps this was the method of bearing the fruit because the flowers would be more readily fertilized, or because the mature pod is so heavy that it would break down the more slender branches, but there are many of the large tropical nuts of even greater weight that are

borne on slim branches. Often the blossoms and fruit appear at the same time on the tree, as in the case of oranges. Sometimes before the nuts are ripe Mexicans cut off the ends of the green fruit and drink the cool, sweet liquid, which is quite similar to maple-sap in taste. This juice the natives claim has also excellent medicinal properties.

The ripe cacao-pods do not resemble any of the fruits grown in the temperate zone. They are eight to ten inches long and perhaps four inches in diameter, somewhat pointed at the ends, and with deep channels on the sides. When broken open, they are found to contain a slimy pulp in which are embedded about sixty seeds in five rows; these are the cocoa-beans of commerce. The beans or seeds are extracted from the pulp and usually dried in the sun for several days. In order to develop the agreeable qualities of the beans, the next operation to which they are subjected is sweating or fermentation. For this purpose in some localities the beans are placed in heaps and covered with earth or leaves, or they may be placed in barrels or boxes and covered with banana-leaves and there allowed to sweat for about a week. Under these conditions, as the temperature of the heap goes up to 140 degrees Fahrenheit, it is probable that enzymes alter the composition of the beans and bring out the flavor. At any rate, their color is changed from a crimson red to dark brown, they lose their disagreeable flavor, and acquire the much prized bitter chocolate taste. The fermented berries bring a much higher price than those merely dried and do not so readily mold. They must be

thoroughly washed and then dried on stone floors in the sunshine or by artificial heat.

In some countries, on account of fear that the beans may mildew in the process of drying, hand rubbing and "dancing" are resorted to. Dancing consists in treading the drying beans with the naked feet, and it not only removes any mildew but polishes the beans owing to the rubbing of them one against another.

Sometimes they are colored by coating with red earth or clay, but there is no excuse for this practice. From the various countries above mentioned, the cacao, packed in bags, is shipped as thus prepared.

The next operation comes under the head of manufacturing, for like coffee, and in a similar way, the beans must be roasted. Then they are slightly cracked, and the germs, shells, and dust winnowed out. The cracked beans constitute the "cocoa-nibs" which are in use in some countries but which are no longer a common article of commerce in the United States.

There are three distinct commodities on the American market produced from the cacao-bean. Probably the most important of these is the chocolate which is simply finely ground whole roasted nibs. If melted chocolate be subjected to heavy pressure in a suitable type of hydraulic press a portion of the cocoa-butter may be squeezed out. This cocoa-butter is a pure vegetable fat, which is liquid at temperatures slightly above summer heat. This forms the second article of commerce from the cacao-bean. The

third is the residue of the chocolate left after the removal of the major portion of the fat and is commonly known in the United States as cocoa or breakfast-cocoa.

Chocolate finds its chief use in the confectionery trade where enormous quantities are annually used in the making of an almost innumerable variety of candies and coatings. Some of the cocoa-butter is also used by confectioners, who maintain that in order to get a smooth, sweet chocolate it is necessary to add cocoa-butter, as it apparently increases the ease with which powdered sugar can be ground into straight bitter chocolate. The remainder of our production of cocoa-butter is used in such pharmaceuticals as ointments and plasters and to a small extent in some complexion soaps.

Cocoa usually appears on the market in tins, either with or without added sugar, and is used in making a beverage of the same name. When one orders chocolate for breakfast at the average restaurant he usually gets cocoa, as this can be prepared by merely adding a teaspoonful of the powder to a cup of hot water. Any one, however, who has been accustomed to real chocolate, brewed by the boiling of the bitter chocolate or chocolate cake, is not deceived by cocoa as it has not the richness nor apparently the same fine flavor as the beverage containing the cocoa-butter as well as the starch and other constituents of the bean. The milder cocoa is often recommended by physicians because it is not so likely to produce digestive disturbances. When prepared by the Dutch method the ground beans are treated with some alkali

such as sodium carbonate, which it is claimed increases the solubility, but it is very doubtful if there is any foundation for this contention.

For the use of the candy manufacturer the beans are simply ground between hot rolls or in edge-runner mills and poured into molds to solidify. This gives what is known as "bitter chocolate." Sweet chocolate, on the other hand, is ground in the same way but a large amount of sugar is mixed with it and various flavors, such as vanilla, cinnamon, and cloves, are at the same time added.

It seemed to be necessary among the Caucasian races to cultivate a taste for the beverage, but like the use of the tomato, there has been for the last hundred years a growing demand for it all over the civilized world. The Mexicans set the example, and no breakfast in that country is considered complete without the staple dish which they call *triste*, made from ground Indian corn and cocoa. The method of preparation of the bean among the Indians were very simple. They roasted the beans in earthenware vessels, mixed them with cold water, adding perhaps, after the Mexican fashion, a dash of red pepper. Well-to-do people flavored the chocolate with vanilla or spices and sweetened it with honey or sugar. The liquid was whipped into a froth and slowly sipped so as to obtain the fullest enjoyment.

Why has this beverage an advantage over tea and coffee, it may be asked. The composition tells us why. Cocoa and chocolate contain a large amount of the fat already mentioned as cocoa-butter, and fats are a necessary constituent of our food. The active

principle is an alkaloid called theobromine, a dimethylxanthin similar to caffein of coffee, but not producing the injurious effect of coffee although, like the latter, mildly stimulating. Cocoa, therefore, is much better adapted to the use of children and invalids than coffee or tea. It is in fact a nutritious beverage. A cup of cocoa, when properly prepared with sugar and cream, gives 279 calories of energy, or one hundred calories more than a cup of coffee or tea.

The people of the United States are evidently fond of cocoa products, not only for making a beverage, but as a flavor for candy, confectionery, cakes, and other foods which are largely eaten on account of this agreeable taste; in fact, we rank first in the list of cocoa-consuming countries. Although large quantities are used in Germany, France, England, the Netherlands, Switzerland, and Spain, we import the manufactured chocolate products from many of these countries, because these people have acquired great skill in making the kind of chocolate or confection which is in favor here. The milk-chocolate from Switzerland is an illustration of this demand. We have here, however, many large and successful chocolate factories. The first of these was established in Danvers, Massachusetts, in 1771, and the American output is rapidly increasing.

YERBA MATÉ

From the South American republic of Paraguay comes into commerce most of that remarkable product maté, or Paraguay tea. How the natives of this

far-away country ever discovered the stimulating properties of the shrub it is useless to speculate, but it was known to them and in common use long before the advent of white explorers. They knew nothing of its composition, but they proved by experiment its agreeable qualities and the best way to cure the leaves and brew the beverage.

A traveler says: "The old, old native keeps alive on maté; the German colonists find it good, and it displaces beer in their daily habits; the Italian settlers in the city or on the farm rapidly acquire the maté habit; the Spanish immigrant drops his high-priced wines and is as well satisfied with the non-alcoholic yerba; and even the North European peasant, beginning a strange life in this newest of new worlds, draws contentment and refreshment from this wonderful weed of South America."

Ilex Paraguayensis (yerba maté) is a shrub of the holly family, bearing leaves six or eight inches long with a finely toothed margin and an acute tip. The trees or shrubs sometimes grow wild in the forests, although they are often cultivated on the plantation. It is said that when the Indians discover a yerbal or maté wood, they build wigwams and camp down beside it for a period of six months or more, to work up and dry the leaves. Their method of gathering and curing the leaves is crude enough. They clear a piece of ground and beat down the soil with wooden mallets; then the leafy branches which they have cut are withered by being placed near an open fire, and later cured on a rack built of poles over smoldering embers. Thus prepared, the leaves are

brittle and can be readily broken to a coarse powder, in mortars scooped out of the ground, for no effort is made to preserve the whole leaves as in the preparation of China tea. The coarsely powdered leaves are then packed in bundles of about two hundred pounds and covered with rawhide for export. Besides being used at home, the tea is marketed in Argentina, but it is seldom seen outside Brazil and other South American countries.

The natives have a novel way of making and serving the beverage. In a gourd, often silver-mounted, a little hot water and sugar with a sufficient quantity of maté are placed, and the vessel is then filled with hot water. Into the opening in the top of the gourd is thrust a "bombilla," a silver tube terminating in a bulb perforated with fine holes. The beverage is then sucked up through the tube, as "cider through a straw." If several persons are to be served, each is furnished with a bombilla and the gourd is passed around, thus saving the use of teacups and saucers.

They have all formed the habit of using the beverage, and it is considered so satisfactory that the natives drink it before every meal. It is a common practice for each one to use as much as an ounce of the leaves a day. Just as tea is served in Great Britain, and coffee among the Turks, so maté is the customary beverage always offered to visitors as an act of hospitality. It is now the universal drink of probably 15,000,000 people in South America.

Chemists have proved that it is the alkaloid caffeine, which is found to the amount of a little over 1 per cent., that gives the maté its stimulating prop-

erty. This is accompanied by a yellowish oil, the presence of which no doubt adds to the agreeable effect. Fortunately maté contains only one-tenth as much tannin as does tea. To the natives it seems indispensable, and they will make long journeys on horseback with little other food than dried beef and plenty of maté. One advantage which maté possesses over other beverages is that the leaves are so easily grown and cured that it is very cheap and within the means of the poorest natives. Says Dr. Zahm: "It is less of an excitant than tea or coffee. Unlike these two, it does not cause insomnia, neither does it induce perturbations of the heart. It is the best substitute known for alcoholic drinks. Where maté is used drunkenness is practically unknown. Among people like the gauchos of Brazil and the Rio de la Plata region, where beef is the chief article of food, maté takes, to a great extent, the place of bread and vegetables." In the year 1908 4,133 tons were exported from the republic of Paraguay, besides the large quantities used at home.

KOLA-NUT

In the tropical Brazilian forests, as well as on the west coast of Africa and the West Indies, there is found growing a tall tree that bears kola-nut. From five to fifteen nuts are bound together inclosed in a woody covering. For consumption they are deprived of their seed coats and masticated when fresh. The powder made by grinding the nuts, making them into a paste, and then boiling them with water, is also served with sugar and cream.



Courtesy H. T. Martin

USE OF BOMBILLA IN SERVING MATÉ



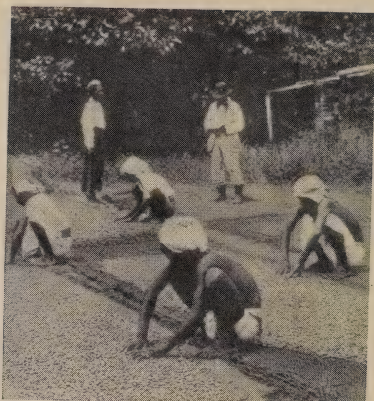
Courtesy Pan-American Union

COLLECTING MAGUEY JUICE



Courtesy Walter Baker and Co.

THE CACAO-TREE



Courtesy World's Commercial Products

TURNING THE CACAO-BEANS



*Courtesy World's
Commercial Products*

PEELING THE FRUIT

Here again an active principle called kolanin, similar to caffein, seems to be developed by fermentation. There is no doubt of its stimulating character, for the natives who use it can endure great physical strain, and the sense of fatigue is soon removed. It will sustain strength on long marches and takes the place of food better than tea or coffee. Whether the secondary effects of this stimulant on the nervous system are injurious has not been fully decided.

GUARANA

Another South American preparation, with which we are even less familiar than with the kola, is the guarana, made from the roasted and ground seeds of the *Paullinia cupana*. It appears in the home market as dark-colored, sausage-like rolls, from which the natives break off pieces to infuse for the beverage. This has also been found to be a hunger-arresting potion and, like others mentioned, contains caffein. It is said to be used with wonderful efficacy by the natives of Brazil on their long marches through the forests and over the plains.

COCA

We need mention only one more of these stimulating but non-alcoholic products, the coca, which is made from the leaves of the *erythroxylon coca* growing in Bolivia, Peru, and other parts of South America. Possibly this should not appear in a list of foreign food products, but in the list of narcotic drugs, for it is the source of cocaine, a valuable drug to the physician and at the same time a terrible master for

those who have learned to abuse it. Its use in South America, however, relates it very closely to our non-alcoholic beverages, as the natives drink a concoction of it; and more especially chew the leaves, in immense quantities, so that the annual consumption is reported as 100,000,000 pounds. It relieves hunger and allows fatigue to be more readily borne. It is not so exciting to the nervous system as tea or coffee, but has a more pronounced permanent action on the system. The effects of the cocaine habit are too well known to require any description.

MAGUEY

In the upland valleys of Mexico, where we should scarcely expect anything to grow, there is found a cactus known as the maguey-plant or agave. It is a wild cousin of the common century-plant, and like it requires a long time for development. Although the maguey grows wild, it has become of so much importance for the preparation of pulque, known as the Mexican national beverage, that great haciendas, where from 500,000 to 3,000,000 plants are cultivated, are common in the country districts tributary to the City of Mexico. As the Russian formerly had his vodka and the Japanese has his saké, so the vaqueros and other peasants must have their pulque.

The maguey is most readily started from suckers. It requires six or seven years to reach maturity, and then, just when a blossom-bud appears in the center of the whorl of spiny leaves, the center of the plant is cut out leaving a bowl or cavity, which soon

fills with sweet viscid juice. This juice is removed by the *tlachiquero* twice a day for three or four months, and then the plant dies of exhaustion. The cavity in the plant is covered during the season by a flat stone. This method of obtaining the sap, although it is more disastrous to the plant, suggests the tapping of maple-trees in a northern sugar bush. The fresh juice called "aquamiel" (honey-water) has a considerable reputation for its medicinal and dietetic properties. For transportation the juice—two or three quarts daily per plant—is sucked out of the cavity into a gourd, poured into a bag made from a pig or sheep-skin, which has been closely shaven on the inside, and carried on the back of a donkey to market.

This sap is very fermentable in the warm climate of Mexico, and after it is poured into ox-hide vats it is allowed to stand for sixteen days before the pulque is ready for use. There is a great demand for it, for no less than 2000 barrels are used daily in the City of Mexico.

Another beverage called mescal or tequila is made by the distillation of the pulque, or of the flower buds. This has been facetiously called a "sulphuric acid cocktail, with a cactus joint for a cherry," as it is a fierce intoxicant.

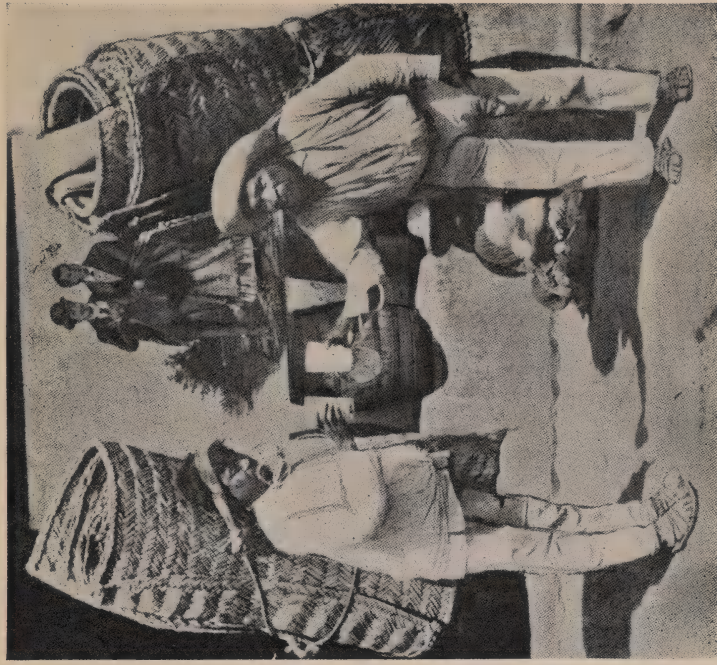
The Indians of Mexico frequently place the buds cut out from the surrounding whorl of leaves in pits lined with stones that have been heated in a bonfire. The pit is then covered with earth and more hot stones and allowed to stand for several days to steam

and cook. The brownish mass that is left has a molasses-candy flavor and consistency, and is eaten fresh by the Indians with great gusto, and if there is any left it is dried in the sun and carried to their huts.



Courtesy Pan-American Union

DRYING MATÉ LEAVES



Courtesy Pan-American Union

DRINKING "YOUR HEALTH" IN A GLASS OF PULQUE



Courtesy United Fruit Co.

CUTTING THE BANANA



Courtesy United Fruit Co.

HAULING TO RAILROAD LINE

CHAPTER XIV

FROM A CENTRAL AMERICAN BANANA PLANTATION

DO you know how to select a ripe banana? Perhaps you think because it is turning yellow that it is fit to eat, but if it is not properly ripened or not sufficiently mature when picked the delicious flavor and aroma of the fruit have not been developed, the starch which was in the green banana has not changed to fruit-sugar, and a disagreeable raw taste still remains. Persons who are supposed to know select those bananas which are "speckled," that is, show numerous brownish spots, not the black patches which indicate overripeness or injury and consequent decay. The tip of the banana will probably be still slightly green. The reason why some have asserted that bananas are unwholesome and not a fit food for growing children or invalids is that they did not consider the difference between green, immature bananas, and the fully ripe fruit. Of course uncooked starch does not digest well. We do not eat raw starch in potatoes; why in bananas?

It is not so very long ago, especially in our sea-coast towns, that the grocers sold from a bunch of imperfect fruit the bananas at ten cents apiece, as a kind of tropical luxury. Nowadays, in normal times, the fruit can often be obtained at the market stands for ten to twenty cents a dozen. This is some

indication of the way in which demand and supply have increased. As for quality, it is asserted that the bananas offered for sale in our Northern markets to-day are fully equal to those sold in Havana, Kingston, or Panama.

As far as we can learn, bananas were introduced into America by the Spaniards several hundred years ago from either Asia or Africa, where they were found growing wild. The enterprise of the people of the Iberian peninsula is but another instance of the large share that these people had in the civilization of those days, when new lands were being discovered and new food products brought to the attention of the Old World. On the other hand, it is asserted on good authority that some types of bananas grew wild in parts of South America long before the arrival of Spanish explorers to those shores.

The banana was first brought to this country in 1804, when thirty bunches came on a coasting vessel from Cuba to New York. One of the earliest shipments was to Philadelphia, where each individual banana was wrapped in tin-foil and sold for ten cents, more as a tropical curiosity than anything else. The quantity of fruit imported gradually increased as vessels carrying West India products visited our Northern ports, but it was not until 1885, when the United Fruit Co. took up the task of growing as well as shipping bananas, that the trade began to assume any commercial importance. In 1910 the imports were more than 3,000,000,000 bananas, a quantity that, placed end to end, would reach thir-

teen times around the earth at the equator, having a wholesale value of \$12,500,000! In 1914 the consumption in the United States alone was 42,000,000 bunches, and in 1921 we imported 43,365,763 bunches. From Central America we imported 28,000,000 bunches, and from Jamaica 8,000,000.

Only in a hot, moist climate will bananas grow to perfection, and so in the western hemisphere certain tropical countries have been selected as especially adapted to their cultivation. Jamaica is much better suited to this industry than Cuba: Costa Rica is one of the most important banana countries, and Nicaragua and Guatemala export large quantities to our Gulf and Northern ports.

We say that bananas grow only in the tropics, and this is in a general way true, the limit for the best production being between twenty-five degrees north and twenty-five degrees south latitude, but the area is really limited more by moisture than by temperature. A yearly rainfall of not less than one hundred inches has been found to be the best for the growth of the fruit.

In the Central American regions, which are very accessible to the United States, the possibilities for a great banana industry were early realized. It required, however, large capital and an immense amount of labor to start such extensive plantations that it would be worth while to maintain a fleet of steamers exclusively for the banana trade. It was necessary to clear and develop the country and to build miles of railroad through tropical jungles to the interior. It is said that at the inception of the

enterprise, before the country was sufficiently cleared and improved so that proper sanitary conditions should exist, four thousand men died from malaria and tropical diseases. In Costa Rica the United Fruit Co. built a railroad from Puerto Limón, now the leading banana port of the world, through the dense jungles to San José, the capital, which is situated on the uplands in the interior.

Long lines of banana-laden mules may be seen filing through the tropical forest toward the railroad, or sometimes aërial cables are used to bring the fruit down from the mountainous country. There are now sixty thousand men working in the tropics for a single exporting company.

As the seeds of the banana are imperfect, it is evident that the fruit cannot be propagated by this means. It is very easy, however, to start a plantation with shoots cut from old plants, and as these sprout very rapidly the tree is matured in about a year. It is always a wonder to the Northerner that so big a plant can be grown in so short a time. The stalk is cut down after the fruit is gathered, but in the hot, moist air of the tropics new stalks rapidly start from the stumps. In the most favored localities the plants once started will continue to flourish and bear fruit for thirty years. It is only necessary to keep down the other herbage in the vicinity. The tree grows to the height of thirty or forty feet, and when the fruit has matured the heavy stalks are partially cut by the natives with a sharp knife or machete; then the heavy fruitage bends the plants to the ground. The flavor is spoiled if the fruit

ripens on the tree, and experience has taught the planters just when to cut each bunch. If it is intended for local consumption it is taken before it is fully ripe but while there is still enough nutriment in the stem to supply the bananas until they are in the hands of the consumer. As the same rule is followed in picking for export, the fruit would seem to the uninitiated to be altogether too green ever to mature, and as has been intimated, this is indeed possible but it is not a common occurrence.

One of the most valuable properties of the banana, in common with the orange, lemon, apple, pear, and a few other fruits, is that it can be picked green and ripened in storage or in transit. Without this property there would have been no banana trade developed, and we could have the fruit on our own table only if we lived in tropical countries. The fruit must be fully developed, however, on the tree; if it is picked before this time and then artificially ripened, a very inferior product results.

To the grower there is said to be a profit of from sixty to seventy dollars an acre, and every time the fruit is handled, on its long journey from the tropics to Washington Market, or any other Northern distributing point, a small percentage must be added to the cost; yet even the Italian vender makes a comfortable living for himself and his numerous family by retailing the bananas to the "Yankees," all of whom have by this time acquired a taste for it.

In grading the fruit, nine "hands" or more give what are called first-class bunches, the average being from ten to twelve hands. Seven to nine hands con-

stitute second-class stock, and anything less is discarded for shipment. Bunches bearing seventeen hands are sometimes seen, but like the immense oranges frequently grown in California, these big bunches of bananas are too large to store or ship conveniently.

When a train-load of bananas arrives at the port of export the fruit is carefully selected for each particular market. The shippers calculate to a nicety the rate of speed of the steamers and the time when the cargo will arrive at a given port, and make such a selection of fruit that it will ripen forty-eight hours after it arrives, so as to give time for handling by the wholesale and the retail trade. It has been observed that when one bunch of a cargo ripens, this condition seems to affect all the others in the vicinity; accordingly these early ripening bunches are removed. The fruit is thus carefully selected for New York, Boston, New Orleans, Chicago, Kansas City, Denver, or foreign ports. The inspector who passes on the destination of each bunch at the wharf has acquired great skill by long experience.

From the dock, loading machines carry the bunches to the hold of the vessel. It is a motley variety of peoples that do the heavy work of loading and stowing away the fruit. There are Cubans, Jamaicans, Indians, and mixed races. As each stem weighs from thirty to eighty pounds, there is much heavy work connected with the loading. Even in this unripe condition the fruit must be handled with care, for a little injury causes quick decay. Twelve hours of strenuous labor will load the cargo.

The steamers are built with a purpose, and that purpose is to carry bananas to the Northern cities in such a way that there shall be the least possible waste; and great ingenuity has been exercised in their construction and furnishing. The refrigerating machinery and the cooling apparatus are on the upper deck, to leave the hold free for stowage of the cargo. Each of the three decks is divided into six chambers, and the chambers are again divided into bins by portable horizontal sparring fitted into vertical posts, so that in rough weather the bunches shall not be injured by rubbing one against another. In this cargo-space are often stored ten thousand bunches.

It is essential that sufficient air be given the fruit during transit, and ventilating apparatus is of the greatest importance. Gratings are laid on the decks to provide an air space below the fruit, and the sides of the vessel are insulated with granulated cork and wood. The refrigerating plant delivers cooled air which may be discharged at will into the various cargo-spaces. To keep the air in motion an electric fan is provided, and the air that is drawn out is cooled and made to part with the moisture it has picked up, by passing it over pipes filled with chilled brine. By these devices dry air at fifty-six degrees Fahrenheit is circulated continually over the fruit. No time is lost at the port of debarkation in shipping the fruit to the various markets. The wholesalers and jobbers at the destination place the bunches in specially constructed cellars, or rooms where steam may be turned in, and the temperature

regulated to ripen the fruit as rapidly as the trade can handle it.

Perhaps one of the chief reasons why there has been such a rapidly increasing demand for bananas is the fact that people have come to realize that they are as much a food as the potato, and not a luxury to be used only for a dessert. The banana, when peeled ready to eat, contains 23 per cent. of sugar and starch, while the potato, also peeled, contains only 15.7 per cent. In the matter of protein the potato contains a little more than the banana, but bananas have more fat; or, to put it in another way, the ratio of food value of bananas to potatoes is 460 to 385 calories.

We can seldom get as good a banana in the European markets as in the United States. This country is highly favored in having a banana zone within easy transportation distance. The European supply must come from Madeira, the Cape Verde, and Canary islands. It is true they are on the line of some of the transatlantic steamers, but although the islands have this advantage, the cost of growing is greater there than in Central America, chiefly because the fruit must be raised on irrigated land.

Not only in our own Southern States, where the colored mammies have discovered numerous ways of cooking bananas to give a delicious variety to the menu, but throughout other countries the fruit is used in numberless dishes. From the green banana an excellent starch or flour is made, for while green it is to be regarded more as a vegetable than a fruit. Although somewhat yellow in color and granular in

appearance, this flour has an agreeable taste and is a valuable food material. It keeps well in any climate and can be readily transported. The Hawaiians use 30 per cent. banana pulp and 70 per cent. of white flour in making bread.

PLANTAINS.

The coarse member of this family, known as plantain, is especially suitable for making starch, the plantain-meal used in the tropics being regarded as one of the staple foods. The plantain is the food-staple—the wheat, the potato, the rice, the bread-fruit of millions of people in the tropics. Although it looks like a large banana, it does not resemble this fruit in flavor or use. Some species of plantain grow to be two feet in length, and in the Malay archipelago a single fruit will make a sufficient meal for three men. The fruit is picked before it is ripe and stewed or cut into slices and baked. To prepare plantain-meal, the unripe fruit is cut in strips, dried, and pounded to a coarse flour in a mortar. This meal can be used for making porridge, cakes, or bread. If well dried it will keep for some time.

On account of its importance as a staple, plantain is grown over a wider area than the banana. There has been some success at cultivating it even in the United States, and it deserves a much more extended trial. In Latin-American countries the natives use the plantain for food, paying less attention to the delicious banana, probably because it is regarded as a semi-luxury whose greatest value is in the money it will bring when exported.

CHAPTER XV

FOREIGN SAILORS AND THEIR CATCH

It deserves commendations; . . . it is an art worthy the knowledge and practice of a wise man.—*Izaak Walton on Angling.*

IN Genesis we read that not only the birds of the air and the land animals but also the fish of the sea shall be under the control of man, and so he has from the earliest time “gone a-fishing” to add to the supply of animal food to support his family. Barbarous tribes in many lands lived almost exclusively by hunting and fishing, and if they were island or seashore people nearly all of their food came from the water. The lakes and rivers provided a never-decreasing storehouse from which they could draw supplies. The fisherfolk in our own country, from Oregon and California on the west, to the Gulf of Mexico, Chesapeake, Cape Cod, and the rocky inlets on the Maine coast, have always drawn a plenteous supply of the best food fishes from surrounding waters. This food is regarded of so much importance that our fisheries commissioners have been studying the habits of fish and trying to protect the young that the supply may not be decreased even where heavily drawn upon to meet the demands of the market. The fishing ground is different from the farm, for we do not have to feed and care for

the fish, they look out for themselves, and all we need to do is to catch and cook them.

With all these sources of supply and many others, why do we go beyond our own shores for fish? To get our daily supply of fresh fish we do not go far out of our own waters, for there is no class of animal food that deteriorates so rapidly upon improper keeping as does fish. It happens, however, that hundreds of years ago it was found that fish could be preserved by smoking, salting, drying or pickling in brine. More recently canning and processing in oil have become very important methods of conserving the fish supply.

With these facts in mind, we can readily see that the fish of other countries becomes available to us. In this melting pot of races, the United States, are peoples from every nation, and they have brought with them their liking for their native foods, including fish. This is perhaps the way in which our own population first became acquainted with such products as "finnan-haddie," French sardines, or Russian caviar. At any rate there has been a continued demand for these foreign products, so that they now add not a little to the variety of our food supply. Imports of fish, including shell-fish, in 1921 represented a value of \$29,041,707.

In shallow waters surrounding the continents, in sheltered bays, and sometimes a long distance up rivers are the spawning and feeding grounds of our food fishes. Some of them spend a large part of their lives in deep water, only going to the shallows and up the rivers to lay their eggs. In these waters

the young fish are protected from their enemies, the larger fish, which live on the "young fry."

There is no other kind of food, except perhaps game, which may to such an extent "be had for the getting" as fish. The supply is always there in the water and, except in a few localities, does not seem sensibly to diminish, even though thousands of tons are taken out every year. To the shoals, known as the Banks, off the coast of Maine, Nova Scotia, and Newfoundland, resort every season hundreds of fishing smacks to harvest the cod, haddock, hake, and other fish that are found in great schools in these waters. By an international agreement between the British Government and the United States, there is a good understanding between these fishermen. Much of the fish set down in our Federal reports as "imported" comes from waters under the jurisdiction of Canada.

The northern peoples are always fishermen. Canada, for instance, employs about 70,000 men in her sea-fisheries, 10,000 in fishing her inland waters, and another 20,000 persons in canning, curing, and preparing the fish for the market. This industry yields more than \$30,000,000 annually. As for lobsters the most extensive lobster-fishing in the world is carried on all along the eastern shore of these Canadian provinces.

In Japan, one of the most maritime of countries, 1,300,000 people are engaged in fishing, and in England there are 100,000.

Considering the world at large, there are really only three great fishing banks—off the northeast



Courtesy United Fruit Co.

LOADING BANANAS ON A STEAMER



Courtesy United Fruit Co.

UNLOADING AT NEW ORLEANS



© Underwood & Underwood

UNLOADING DRIED FISH

coast of Asia, northeast of North America, and northwest of Europe. Norway is perhaps the country most dependent on its fishing industries. It is just on the edge of the big fish pond which yields each year over \$80,000,000 worth of fish to the hardy seamen.

In addition to the fresh fish brought into our market from Canadian territory, our imports include dried, cured, or preserved cod, haddock, hake, and pollock, coming principally from Norway, Denmark, and England, and fish packed in oil or otherwise preserved coming from Norway, France, Portugal, and Spain. There are also two varieties of fish that are so important and imported in such great quantities that they are listed separately, namely, herring from the Netherlands, Norway, Scotland, England, and France, and mackerel from Norway, England, Sweden, the Netherlands, and Ireland.

On a transatlantic voyage, after you leave New York or Boston, you skirt for a day or two the banks lying one hundred miles east of Cape Cod and extending for less than seventy-five miles opposite the shore of Nova Scotia and Newfoundland. You will probably be inclosed in a dense fog, the steam whistle will shriek all day long and through the night, and you cannot sleep. The only consolation afforded you by your fellow-travelers, is: "When we get clear of the Banks fair weather may be expected."

This is the richest fishing ground in the world. It is a continental shelf, built up largely by glacial deposits millions of years ago. The water is only fifteen to thirty fathoms deep, while to the eastward

the bottom suddenly drops off to real oceanic depths of thousands of feet. There are rapid tides washing this bar, and they surge up into the Bay of Fundy, giving a forty foot rise and fall every twelve hours. The sea-bottom readily becomes covered with pebbles and glacial detritus, but is kept clean of this continental deposit by the inward and outward rush of the tides. It is an ideal feeding-ground for such food fishes as cod, haddock, halibut, and hake.

The Banks are variously named as Brown's Banks, the Banquereau, La Have, Sable Island, St. Peter's, George's Shoals, and the Grand Banks. The waters are frequently, in fact one might say usually, rough, and the hardy seamen in their trawlers brave all sorts of perils, especially in February and March, in their search for food from the sea. Some years ago in a single gale, thirteen vessels with their crews were lost, many of the wrecks being due to collisions in the fog and broken anchor-cables in the storm. But, as one old Gloucester salt remarked: "Times ain't what they used to be; most of the smacks come home now with full crews. In the good old days we could usually count on part of the fleet going to Davy Jones and every vessel losing a man or two. Fishin' 's gettin' tame."

The fishing vessels are fitted out in Massachusetts, Maine, and Lunenburg, Shelburne, Yarmouth, and Digby in Nova Scotia. They formerly anchored on the Banks, and the men fished from the decks of the vessels, but the method at present employed is for the fishermen to bait their trawls, which are long lines carrying many hooks baited with chopped

frozen squid, and then go out from the vessel in small boats or dories, two men in a boat, to the fishing grounds. The vessel tows the dories over the fishing grounds, and drops them one after another at suitable intervals. An anchor is thrown out from the dory, and to this is attached a buoy to mark its position. The boatman then with his heavy oars pulls away from the buoy, and at the same time his companion lets out the trawl over the side of the dory. When the tub containing the line is empty and all the trawl has been paid out, another line from a second tub is "bent on" to the first line, and the work proceeds until sometimes as much as a mile of trawl is paid out. After a short time the fishermen begin the laborious work of hauling in the trawl over a roller on the gunwale of the boat, and one takes off the fish while the other coils the line in the tubs.

The fish bite rapidly, and when the boatmen have caught a load, they raise an oar as a signal and the vessel bears away toward them to pick them up. The dory comes alongside, and the load of fish is pitched with a fork over on the deck of the vessel. After a day spent in fishing, the dory is hoisted aboard the schooner, and a good part of the night is frequently spent in dressing the fish by the light of smoky torches and packing them in chopped ice in the hold.

Even this method of harvesting fish has not proved rapid enough for some of our modern fishermen, and recently steam-trawlers have been introduced. They drag a heavy net along near the bottom and take in

everything that comes in their way. As the bottom is frequently disturbed and a lot of small useless fish are caught, this method threatens utterly to destroy the fishing industry. Already in Europe the Beam-trawl system, as it is called, which was introduced in the eighties, is driving the fishermen away from the home fishing grounds toward Iceland and the northern waters. In fact, in England consumers are obliged to use smaller fish and those of inferior quality to what we at present use in this country. Many English and Scotch towns have been obliged to abandon the fishing business entirely. Government intervention may be necessary to prevent this industry from being destroyed by the cupidity of man.

Why is the North Sea such a favorite fishing place? Look at its ideal situation as a feeding-ground for the fish. The currents between the Shetland and the Faroe islands to the north of Scotland bring in the tepid water of the Atlantic. The warm Mediterranean waters swing around to the north and meet the cool surface waters from the Arctic seas. Into this surging mixture of waters flow the sluggish German rivers, bringing organic refuse from the Central European towns, and these are further enriched with fish food by the murky waters of the Thames, so that off the Dogger Banks there is always enough to eat for the billions of fish that frequent these seas.

To the hardy fisherman, from the thirteenth century down, who plied their trade in the waters of the North Sea, the English Channel, and the Bay of

Biscay, we owe many of the discoveries of new lands and new peoples. They often, like the angler who whips the streams in the thinly settled regions of the country, sought "better fishing" farther away from "where everybody fishes," and so penetrated to hitherto unknown lands. They were prominent among the first discoverers and navigators. All around these bodies of water, from the Cornish shore, on both sides the channel, and in the North Sea, in the icy fiords of Scandinavia, and southward to the Portuguese shallows, there are still standing many interesting and picturesque fishing villages, which have, in a wonderful way, retained the characteristics of centuries gone by.

So large is the quantity of fish caught annually in the North Sea—one and a quarter million tons—that it has been estimated "they would fill a procession of two-ton trucks reaching from New York to San Francisco by the way of New Orleans." The British use these fish to the extent of more than twenty-two pounds per capita annually.

For many years the city of Grimsby on the Humber has been the fish town of England. Think of three hundred thousand tons of fish brought in by the trawlers and offered for sale at auction in a single year. Much of this fresh fish goes to London, for it requires a million and a half pounds of fish a day to feed the city. When the war came on and the trawlers gave up the pursuit of fish for the still more dangerous search for submerged bombs, it was no wonder that the people of the British Isles began to suffer for want of their accustomed food.

“Who’ll buy my caller herrin’?” is the fish-woman’s cry on the streets of Edinburgh. She is selling fresh fish. On this side of the water there is a demand for a hundred million pounds of herring every year, and this great store of fish comes from Holland, Great Britain, Norway, and Canada. They may be Yarmouth bloaters, selected and fat, half salted for immediate use, or kippered herring, which are split, salted, and mildly smoked, or red herring, both salted and smoked.

The cod fisheries off the Lofoten Islands of Norway have long been a source of national wealth. Although these islands are within the arctic circle, the climate is not so rigorous as one would suppose, on account of the warmer winds that blow so much of the time from the southwest and the prevailing ocean currents from the same direction. From the deeper sea cod come to the shoals on the east coast of these islands and in the Vestfjord in March and April for the purpose of spawning. The fish are caught in nets let down at night, on lines or trawls sometimes a mile long, and also by hand-lines. Often as many as 40,000 men are employed in the fishing season, although the local population is very much less. The fish is dried during early summer for export. By-products of the cod-fishing are the manufacture of cod-liver oil and the preparation of fertilizers from fish refuse. Great quantities of herring are sometimes taken off the coast of Vesteraalen, one of these islands, but the fishermen cannot depend on any regular visits of the fish to their coast.

The coast of Norway is particularly well situated

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for the fishing industry. In April and May shoals of capelan appear off Finmarken, and then come the cod, small whales, and other fish which feed upon them. There is both a spring fishery for herring and one in November and December. We find excellent mackerel fishing from Trondhjem Fiord to the Gulf of Skagerack, and salmon and sea-trout may be caught in the rivers and at certain seasons off the coast.

In the Baltic Sea, in fishing for flounders, two sloops steam out together to the grounds and then run in parallel courses, pulling a drag-net between them, and sweep everything that comes in their way into the net as the two ends are brought together. The fish are hauled up and frequently stored in a salt-water well in the hold of the vessel so that they will be fresh for the market when they are brought in a day or two later.

Fishermen endure all sorts of hardships as they follow their vocation, and the women must bear their share of the work and worry. The words of Charles Kingsley's poem keep running through your mind, as you watch these "toilers of the sea":

Three wives sat up in the lighthouse tower,
And they trimmed the lamps as the sun went down;
They looked at the squall and they looked at the shower,
And the night-rack came rolling up, ragged and brown;
But men must work, and women must weep,
Though storms be sudden and waters deep,
And the harbor bar be moaning.

The men who go out from the ports in the north of France are described as "silent, stern, and super-

stitious." They still observe many strange religious rites, and they always ask the good father of the village church to bless their boats before they put out to sea on an important fishing cruise.

The more prosperous of the fishermen own their boats and hire their own men; others pool their funds and hire a boat from the owner; and those who are least prosperous work for those who own or hire the smacks. As a proof of the generosity of these fishermen, it is stated that when one of their number dies, if he was married his widow sends out her nets with the other fishers, and she has her share of the catch just as if her husband were living. The women seem to be superior to the men and better educated, and have the largest part in managing the financial activities of the family.

There is a great variety in the fish which are caught. There are skate, mackerel, soles, turbot, brill, plaice, flounders, bream, and many others. The fish, as soon as they are caught, if they are to be sold fresh, are disposed of to an agent who immediately ships them to the Paris market.

One of the most important ports for outfitting in the herring fishery is Boulogne. Vessels known as "steam-drifters," on arriving at the fishing grounds, often quite a distance from the home port, throw out a gill-net which has meshes with openings just large enough to catch the herring by their fins or gills. One end of the net is anchored by a cable, and it is then slowly paid out over a roller on the gunwale of the boat, until frequently as much as four miles of net are set. The net sinks down nearly to the bot-

tom of the bay, where the fish are feeding, and after some time the arduous task of hauling in the catch begins. As the net is pulled in over the side of the boat, some of the men take off the fish, while others stow away the net so that it shall be in shape to run out again for another haul. The catch on a single trip is often eighty thousand fish, and if the fishermen have particularly good luck, it may be as much as three hundred thousand.

The possibilities of the Mediterranean Sea as a source from which a supply of food fish may be drawn are very great. The Mediterranean is a warm sea, never below fifty degrees Fahrenheit, and abounds in fish of all kinds, but has never been as industriously worked as the more northern waters. Spain and Italy, strange as it may seem when their long line of seacoast is considered, import more fish than they catch.

There is one fish, however, for which the Mediterranean Sea is famous and the catch large; that is the little fellow, bluish-brown on the back and silvery white on the belly, known as the anchovy. In the spring, immense schools of these enter at the straits of Gibraltar and utilize, as a summer-resort, the shoals around the Andalusian and Italian islands and adjacent shores. These fish are caught with a seine, which is slowly dragged toward the shore by two boats and finally taken out in shallow water by the women and children who are waiting for the catch.

The anchovy has been a favorite appetizer since early Roman times, for we read of the use of *garum*,

a form of anchovy sauce, at Roman banquets. Hindu cooks also make a condiment called red-fish, which is prepared from anchovies caught in the rivers of India.

To prepare them for the market, these fish are dressed, decapitated, packed in barrels with salt and red ocher. Large quantities are sent to Italy, England, and France, where they are bottled in brine and exported under the labels of these countries. Anchovy-sauce is made by pounding the fish in water and simmering with cayenne pepper, sugar, bay leaves, sandal-wood, cloves, and other kinds of seasoning, and then passing the decoction through a sieve. Anchovy-paste is made in a similar manner, the fish are often tinned or put up in oil.

The anchovy industry is also carried on in Swedish waters, where there is utilized for this purpose a small herring known as the sprat or, as it is called, *ansjovie*. These fish are canned with oil, sugar, and spices, in a manner similar to that used for the Mediterranean anchovies.

The sturgeon, a large fish which frequents the northern waters of the United States and the Great Lakes and is caught in large quantities in the Caspian, Azov, and Black seas, by the Russian fisherman, is of more interest to us on account of its by-products than strictly as a food fish. It is like the salmon in dividing its time between the deep sea and the rivers where its goes to spawn. The sturgeon "is from six to eleven feet in length and it is believed to live for two or three hundred years."

To the Russian peasant the catching of one of

these big fellows is almost a fortune, for he utilizes it all. Besides using the flesh for food, he gets oil from the refuse and from the bladder makes a high grade of isinglass. This term, by the way, is a curious corruption of the Dutch *huizen blas*, meaning sturgeon bladder. This isinglass is in no way related to the transparent mineral mica, sometimes erroneously also called isinglass. Another important fish product is caviar, which was originally made from the sturgeon roe. The roe are carefully beaten with twigs to separate the individual eggs from the surrounding membranes, and the mass is then rubbed and pressed on a wire screen so fine that the eggs will drop through into a vessel below, while the surrounding tissue will be retained on the sieve. Salt is then added to the roe, and it is carefully stirred until it forms a brine. This brine is poured off, and the eggs remaining are packed in barrels and constitute the caviar of commerce. These eggs are sometimes dried or salted for the market.

In the United States, the eggs of fish other than the sturgeon have been marketed for caviar. On this account, the Bureau of Chemistry of the United States Department of Agriculture has ordered that the name of the particular fish from whose eggs the caviar is made should appear on the label, for example, spearbill-caviar, whitefish-caviar, and so on.

Our imported product has come principally from Russia, especially around Astrakhan and the Volga, but more recently larger quantities of caviar have been prepared in Sweden, Norway, and Germany.

We have for years imported quantities of sardines from Europe. With reference to this industry abroad, Carl Bailey Hurst, consul-general at Barcelona, writes:

Sardines are found chiefly in the Atlantic Ocean, forming great schools or banks extending from the coast of Ireland to the Canary Islands. They are also found in considerable quantities in the Mediterranean, probably coming from the Atlantic, attracted by the higher temperature of the water. However, sardine fishing is of less importance on the Mediterranean shores of Spain than on the Bay of Biscay and the Gulf of Cadiz, where the principal factories for canning sardines are located.

The supposed difference between sardines found in various parts of the world has been much disputed, but repeated investigation has demonstrated that no generic difference exists, as the sardine is not a sedentary fish but inhabits the ocean at large, migrating from coast to coast in search of food and mild waters. This explains its appearance and disappearance—both dependent upon the movement of warm currents—and its particular abundance on the coast of Galicia. Near Finisterre, in close proximity to the Gulf Stream, the sardine is usually first seen.

The sardine is always found in the superficial waters of the Mediterranean, where fishermen encounter it during all seasons; the quantity, however, varies considerably with the season. During the spring the sardine appears only at brief intervals, in small masses; during summer and autumn it is always abundant.

In the waters of the North Atlantic, on the contrary, the sardine is entirely absent during the winter, not appearing until March or April to any noticeable extent. This fish is encountered on the shores of the Iberian Peninsula, later in the southern part of the Gulf of Gascony, and so on farther north—always influenced, as in the Mediterranean, by the climatic conditions and also, it has been found, by the configuration of the ocean bed. The sardine in both waters derives alimentation from minute bodies adapted to the smallness of its mouth and teeth. Protozoans are its principal food.

F. C. Weber writes that from 1910 to 1916 fish packed in oil came from France, Norway, Portugal, Italy, and Spain and was valued from \$1,911,346 to \$3,178,000, France and Norway furnishing the largest quantity. The pilchard, which is sent from France, is considered the best fish in size and flavor for making the canned product. Hence the French sardines are much in favor. The French generally use olive-oil, while cottonseed and peanut oil are used in Maine. If olive-oil (to be used exclusively for canning sardines) were admitted free of duty, as is the case in Canada, it would do much towards the improvement of our sardine pack.

The name sardine comes from the island of Sardinia in the Mediterranean Sea, in the vicinity of which these fish are very abundant. As now used this term applies to small fish of various species which are canned in different parts of the world. In the French sardine industry, it is the pilchard, in Norway the brisling or sprat; the California sardine is very much like the French species, and the sea-herring is the fish utilized on the Maine and Canadian coasts.

We always used to get our supply of sardines for the picnic lunch from Europe, but the Franco-Prussian War cut off our supply temporarily, and then we began to investigate our own resources in the United States. The first successful cannery was established at Eastport, Maine, in 1876.

In the preparation of sardines for export the older method of both cooking and canning them in olive-oil is now almost unknown. The present-day prac-

tice is to heat the "little shiners," after they have been more or less washed and usually beheaded, in peanut-oil. After being fried in deep fat much as we make Saratoga chips, they are drained and then put in tins, which are filled with olive-oil before being closed. Olive-oil is not a good cooking fat, as it smokes and becomes rancid quickly if heated for any length of time; hence the frying in peanut or cottonseed-oil.

CHAPTER XVI

WHAT OTHER PEOPLE EAT AND WHERE THEY DO THEIR MARKETING

JUST as we say that the costumes that the people of other nations wear are strange and outlandish, and that their religious rites and ceremonies are interesting and curious, so we say that the food habits of those people who live far away from us or with whom we have very little acquaintance are strange or perhaps disgusting.

When persons who consider themselves highly civilized reckon as one of their most important meats the domestic hog, which is acknowledged to be the scavenger of the farm, or when they consider the lobster—which is a scavenger of the sea—a great delicacy, they should be slow to condemn the food choice of other peoples, who have often been driven by dire necessity to use for food animals which we reject. It is one thing to go to a well-stocked market and select any one of half a dozen kinds of meat for dinner, and another to forage through the fields and forests to get enough to drive away starvation.

There seems always to be a craving for meats, and often the higher the state of civilization the greater the quantity of animal food used. The comparatively slight use of animal foods by the man with a small income is due to his limited means

rather than because he would not eat more if he could afford it. The peasant peoples of Europe do not abstain from flesh foods so much because they do not care for them as because they have not the purchase price. Meat once or twice a week is all that their income will allow.

Travelers who take delight in exploring the backwoods and out-of-the-way corners of the earth have found some strange food habits among the peoples of these climes. Some of these do not appeal to us. The Kafirs of South Africa collect caterpillars, and after crushing the heads, dry and pack them in grass for future use. Some of the Australian tribes eat ants, caterpillars, and cicadas' pupa cases. The flesh of snakes is, with them, considered a delicacy. To prepare it for the table it is placed in holes in the earth that have been lined with hot stones. Green leaves and earth are thrown over the food, and in a short time it is thoroughly roasted and steamed ready to serve. Who shall say that the clam-bake was original only with the North American Indians? The "Medical Register" says that in the Canton market edible rats bring fifty cents a dozen, and the hind quarters of dogs sell at a high price as a table delicacy. The Digger Indians eat dried locusts, and the natives of some parts of Argentina class skunk steak as a delicacy belonging to the same order as our "yellow-legged" pullets.

If you go into the markets in Corsica, or even in Genoa and Naples, one of the first things that will attract your attention is the enormous tentacles of the devil-fish, cooked and cut in slices ready to serve

to hungry customers. Why should people restrict their eating to the eggs of hens and other birds? In the West Indies and along the Pacific shores lizard-eggs and alligator-eggs are a staple food. Turtle-eggs are industriously gathered and not only cooked and eaten, but when broken into a vessel and beaten they constitute turtle-egg butter, a much prized addition to the menu in our own Southern States.

In the forests of Mexico, where parrots nest in the dense foliage, this bird is valued for food. If you go to New Caledonia, do not be surprised to have roast spiders occupying a prominent place on the bill of fare! The Singalese will treat you to a repast of cooked bees.

Speaking of the use of insects as food, Percy Collins directs attention to the fact that in Africa, locusts are a staple diet and a luxury. That they were used in very ancient times is proven by the sculptures found in the ruins of Nineveh. They are so much prized that they are seen in the market more often than even figs or quails. The use of this insect as food was permitted by the Jews, and locusts are still eaten in Palestine. Our modern cooks might be puzzled as to how to prepare locusts for the table, but it is no problem for the natives of Arabia Petræa. The insects may be fried in sesame-oil, or they may be dried, ground, and used as flour for cakes. In Madagascar they are baked in jars, then fried in grease, and eaten with rice. In Algeria, locusts are boiled and salted. Among the Arabs they are ground, baked, roasted, or eaten

with camel's-cheese and dates. This last mixture would not be so bad in the eyes of the dietician, as it contains a fair proportion of protein, carbohydrates, and fats; it is indeed concentrated nourishment.

In southern Russia locusts are smoked like fish. Their flavor is said to be strong when raw, but mild and agreeable when cooked. The broth made from locusts has a taste similar to chicken-broth. Every one will agree that the taste for locusts would have to be an "acquired taste." But in the face of the fact that so many of our tastes are already acquired, who shall say that a taste for "locusts and wild honey" cannot be cultivated, even if we do not live in the wilderness as did the prophet of old?

There are a number of animal foods that might be used if we were only accustomed to them, or if we were driven by necessity to use them to sustain life. The people of the northern nations have long used bear-meat as a staple food. There was a time when the flesh of the buffalo sustained thousands of North American Indians. Cats are eaten in China, and have been eaten by the inhabitants of European cities when driven to the verge of starvation as in the siege of Paris. We regard the camel as a beast of burden, but in Africa the flesh is eaten with relish. Dr. Livingston in writing about an elephant says; "we had the foot cooked for breakfast next morning and found it delicious. It is a whitish mass, slightly gelatinous and sweet like marrow. A long march, to prevent biliousness, is a wise precaution after a meal of elephant's foot. Elephant's trunk

and tongue are also food and after a long simmering much resemble the hump of the buffalo and the tongue of an ox, but all the other meat is tough, and from its peculiar flavor only to be eaten by a hungry man."

Why do we not call up the butcher and order a horse-steak? Is it not, after all, because we are not accustomed to it? The Russians have always eaten horses, and the people of Denmark have used them for more than a hundred years. All through central Europe you see the sign, "Horse-meat sold here," and it attracts no more attention than our common sign, "Oleomargarin sold here." In Austria two or three generations have grown up on a diet containing horse-meat. In Berlin in a single year upwards of a thousand horses are slaughtered for food. They are carefully inspected before being killed, just as we have government supervision of the packing-houses here. The flesh of the ass, the hippopotamus, the kangaroo, the ostrich, and the rhinoceros are all considered good food by the people of the various countries where these animals are abundant.

Special mention should be made of the reindeer, as our own government systematically attempted the raising of reindeer for food and to furnish milk in Alaska. This experiment met with such great success that now, where the animals have been protected since the year 1892, it is estimated that there are 200,000. More than 6000 carcasses will be available for shipment to the United States markets next year.

“What about the earth-eaters?” is a question frequently asked. Of course, ordinary earth contains very little that will support life, but Humboldt describes a tribe living on the Rio Negro who existed for a part of the season on a fat unctuous clay. These earths have been found to contain the remains of microscopic animals and plants that had been deposited from fresh water. In northern Europe it is said that a kind of earth known as “bread meal,” which contains empty shells of infusoria, is frequently used, and famine has sometimes driven the peasants to use this earth as their principal food. In some African countries, the natives eat earth, but as they prefer that coming from ant hills, it is evident that the remains of the ants furnishes the nutriment.

The mean annual temperature doubtless has its effect not only on the variety of food a people consumes but also upon the relative proportion of starches, proteins, and fats. From their accounts one gathers that the polar explorers soon learn to like whale-blubber, which is of course almost pure fat. The dweller within the arctic circle not only cannot obtain a great deal of vegetable foods but does not seem to care for that which he can get. Then as we come farther south to Japan, we find the whale still a common article of food, but it is the great lean steaks, not the fat that is eaten. During the war, some of us were treated now and then to fresh and canned whale-meat and found it not unlike a fair grade of roast-beef. It is an established article of import to-day through our western ports,

but used principally, of course, by the Oriental population of the Pacific States. Only our prejudice prevents us from putting the flesh of this warm-blooded mammal on our bill of fare!

Speaking of fats and oils, it is interesting to know that linseed-oil, used almost exclusively with us for paints and similar technical purposes, is the staple edible oil of large parts of Russia. True, the oil the Russian uses, as we do gravy or butter on our bread, is perhaps a little sweeter than our paint-vehicle, since he makes it in a crude way without cooking the flaxseed and does not, therefore, get out so much of the bitter mucilaginous substances. Another favorite edible oil in Russia is that from the sunflower-seed, and this too, when used at all in America, is for making either paints or soap. By the way, did you ever eat roasted sunflower-seeds or cakes made from the seed meal? If you will nose around in the Russian quarter of New York or any of our other large cities, you will find the children buying sacks of parched sunflower-seed and munching them on their way to school just as our own kiddies do peanuts and with just about the same trail of shells along their path. The Hindu boils his butter and makes of it a sop instead of a spread for bread. This may be on account of the difficulty of keeping it in a solid state in his climate, but whatever the reason, it is a very rank tasting article that he enjoys and one for which we Occidentals could hardly cultivate a taste.

At the various entry ports of this country are buildings known as "appraisers' stores," where all

dutiable articles not examined on the docks are brought for appraisal. In the rooms of these "stores" devoted to food-stuffs one will see any day a most interesting collection of strange products. Many of the consignments are small personal packages sent by the folks at home to the children in America. From Italy come small trunks and boxes often packed with a conglomeration "of things that have never been neighbors before." Iron shoe-lasts, a lace shawl, a string of those leather-like cheeses in assorted sizes of goat-bladders, dried figs strung on a reed, and of course a string of garlic, the tops woven together into a short rope. And from China come all the "makings" for chop suey and the other savory dishes of "Le Chang's Mandarin Café"; also oysters dried and coated with lime, mummified duck-eggs which, when the shells are removed, disclose a small greenish marble that, to say the least, does not look very appetizing. Some duck-eggs he sends in "fresh," wrapped in mud and packed together in a box which one would never suspect contained delicacies. You will find there, also, cases of rice-worms, rolled out into thin flakes and dried, and various animals pickled in a so-called wine. Dogs and rats are the usual meats, and they are as a rule pickled whole.

Another side-light on the wonderful mixture of "peoples and tongues and races" that is to be found in the United States is brought out by a visit to the markets of any of our great cities. It is not nearly so necessary as formerly, in order to find out something of the food habits of the people of a foreign

country, to visit that country. They have brought their food products and their methods of preparing foods with them. Of the millions who have landed on our shores, thousands never stray a hundred miles from Castle Garden or the port where they disembarked. They have built up colonies of their own compatriots in our large cities and introduced "home-cooking," often of imported home products.

As an illustration, look at the Latin-Americans in New York and its vicinity. The demand has brought the supply of shops and restaurants where the Mexican can get his hot tamales or tortillas. The family that emigrated from Argentina can get the strips or ribbons of sun-dried beef, to which they have been accustomed, hard, dry, black, like a rope, but nutritious and appetizing. The natives of Ecuador or Colombia will find there manioc-meal from the slopes of the Andes to make their cassava-bread or hardtack. The Arab colony in New York have their raisins, dates, figs, carob-beans, and jujube-sugars; and the Greek, his currants and confections.

FOREIGN MARKETS

This glimpse of the food habits of the peoples of faraway lands may induce you to want a more intimate acquaintance with these people, to see how they buy and sell in their markets at home, for there is no better place in the world to study the common peoples of a country than in their own markets. The market-place, called by a different name in each country, is the one place where the people gather in their quaint costumes and buy and barter in their

strange patois. The market-place itself, in the Old World especially, is usually in the central part of the city, or what was once the oldest part of the city. It is surrounded by antique buildings, showing the changing architecture of the centuries. The church, cathedral, or mosque is near-by; it is the hub toward which all the avenues of trade converge.

And the peasants, starting before dawn have trudged many weary miles to bring their little store of produce to exchange for silver or for the necessities of life. The donkey, the dog, or the cow has helped to draw the load. The word "helped" is used advisedly, for it is a common sight in central Europe to see a woman and a dog yoked together drawing the cart to market. During market hours the dog, if he happens to be the animal selected to assist in the market expedition, rests quietly beneath the cart, or if of a social disposition, discusses with other dogs the different ways that his master has of "taking all the joy out of dog life."

Here the farmer, or perhaps the truck-gardener, as we should call him, appears in the native costume of the country. He is not "fixed up" to see visitors or to have his picture taken to sell to tourists—it is the peasant himself. His good wife is wearing the quaint head-dress of her provincial village, and she is evidently proud of the distinction that it confers. She appears in no way conscious of its picturesque beauty.

More frequently it is the woman who markets the produce and drives a sharp bargain with the purchaser, while the head of the family smokes and

drinks his social glass in the neighboring inn. Really, it is the woman who ought to finish the transaction and receive the money, for has she not with painstaking care, toiling early and late, raised the vegetables and fruits which she is selling? And did she not pay, from her pitiful store, the octroi or tax, which was demanded at the city gate on all materials that passed through?

There is a babel of tongues in the market-place, for it is here that the common language of the common people is spoken. If expletives too strong to appear in print are used as a necessary part of the transaction of the buyer and the seller, here is the place to hear them.

A few hours later, if you stroll into the market-place, you will find it deserted, for those who met there to "buy and sell and get gain" have all departed; the temporary booths and tables have all been packed away; the straw and rubbish have been swept up; and quiet reigns here until the early dawn of the next market day.

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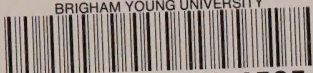
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